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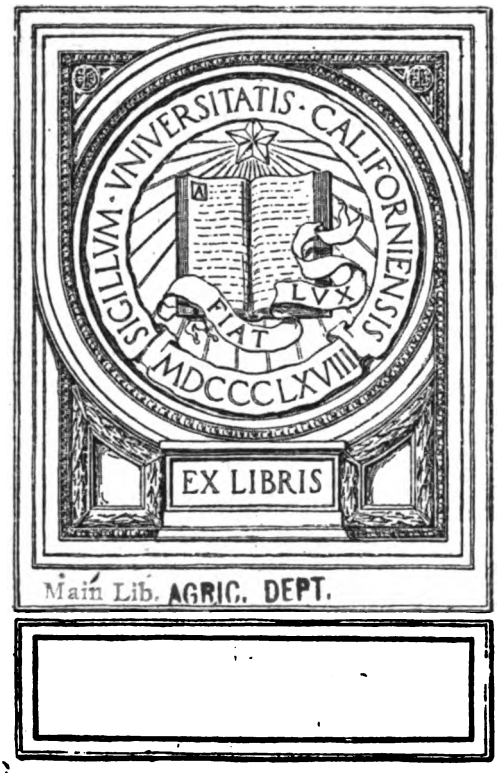

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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
BRANCH OF THE LIVE STOCK COMMISSIONER
POULTRY DIVISION

F. W. HODSON,
Live Stock Commissioner

F. C. ELFORD,
Chief of Poultry Division

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FARMER'S POULTRY HOUSE

BULLETIN No. 8

Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.

MAY, 1905

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OTTAWA, May 1, 1905.

To the Honourable
The Minister of Agriculture.

SIR,—I beg to transmit herewith bulletin 'The Farmer's Poultry House,' by F. C. Elford, Chief of the Poultry Division, and to recommend that it be printed for distribution.

I have the honour to be, sir,
Your obedient servant,

F. W. HODSON,
Live Stock Commissioner.

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THE FARMER'S POULTRY HOUSE.

I. Introduction.—The poultry house on the farm has not received the attention that the merits of the industry demand. The increasing prices of poultry and eggs, however, are creating an interest in poultry and poultry houses to such an extent that many are inquiring about practical plans. To get the best results suitable houses must be supplied the laying stock. These houses need not to be expensive, and a number of plans are given in this bulletin that contain ideas which may be included in the construction of a poultry house on the farm. The various plans herein shown are of houses used by up-to-date practical Canadian poultry raisers. Each plan contains good ideas, some of which may be adapted as the needs of various poultry men demand. The walls may be constructed of any material that insures perfect dryness. Most climates do not require more than a well drained earthen floor, but in a moist climate a floor is essential and in some instances it is beneficial to raise it from the ground.

II. Why Comfortable Houses are Needed.—With the average farmer, comparatively little attention has been given to his poultry house, under the excuse that poultry does not pay. Poultry, if handled properly, does pay. According to the statistics for Canada of 1903, we find that for every dollar invested in land there is a revenue of 20 cents in the way of field crops, for every dollar invested in bees the revenue is 50 cents, and for every dollar invested in dairy cattle, the revenue is $1; but for the dollar invested in poultry, there is a revenue of $2, and this revenue comes in spite of the fact that poultry does not receive the attention it merits. Give it the same attention that we give the other adjuncts to the farm and the revenue will be even better. To get the best results, we must have suitable buildings; not by any means expensive, but comfortable. We might as well try to make a profit out of dairy cows wintered at the straw stack as to expect hens to pay with the treatment they so often receive. A farmer who was losing his hens wrote Prof. Dryden, of the Utah Experimental Station that his hens were dropping dead, and asked what was to be done. In reply the professor said to never mind it was a way hens had; some preferred death to the treatment they received.

The demand for good fat poultry and fresh eggs is growing. The more we raise the greater the demand and the higher the price. A shortage exists for more than half the year. G. F. Johnston, Dominion Statistician, has compiled the following figures and comparisons to show where we stand in regard to this growing industry.

'According to census of March 31, 1901, there were 16,500,000 hens and chickens in Canada, and in 1891 there were 12,700,000, showing an increase in ten years of 3,800,000, or 380,000 a year.

'There would now be 17,500,000 if that rate of increase has been maintained. Of the 16,500,000 there were 233,612 pure-bred fowls; of these the Plymouth Rocks numbered 80,102 (34·29 per cent). The Leghorns numbered 29,033 (12·42 per cent); the Brahmas 7,788 (3·33 per cent); Game, 3,955; Cochins, 2,574, and other families, including Orpingtons (144), 7,502. The pure breeds unspecified numbered 80,215.

'We had then 16¼ millions of the scrub or common birds. The industry of this great array of crowers and cluckers resulted in the production of 84,132,802 dozen eggs in the twelve months of the census year. The value of these millions of dozens was set down at $10,268,159, equal to 12·23 cents per dozen. In addition, the poultry slaughtered had a value of $1,369,259.

The value of the living birds on March 31, 1901, is set down at $3,500,000, a total value of products and of stock on hand of $15,000,000.

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How do we compare with our neighbours on the other side of the line?

They had 233,598,035 hens and chickens in 1900. That sounds a large number, but when we test the figures they are not so far ahead of hs. We had 3·08 hens per head of olr pophlation, and they had 3·33 per head, which is only a quarter of a biddy more per head.

If we assume that two-thirds of these were laying hens, the great Canadian hen laid 91 eggs in the year, and the great United States hen laid within a fraction of 100 eggs in the same period. But our hens' eggs had a value of 12½ cents per dozen, while United States hens' eggs averaged 11 1-7 cents per dozen. Our smaller average number had the same value as their larger number, and our hens was saved the exertion of laying those nine extra eggs.

The Canadian hen raiser must look better after his hens, in their food, their age, their shelter, their breeds and strains and their general management. He should never be satisfied till he reaches double the present egg-laying record of his hens. It is well to aim high in egg production as in other things. By breeding from the best and the best only each year, and selecting these by the use of trap nests where convenient, it will not take many years to double the average production of the Canadian hen. Indeed, if poultrymen and farmers would pay attention to this matter of selection, it would not be too much to expect that before another census year rolls along (1911), the average Canadian biddy would lay at least 150 good large eggs in the twelve months.

Prince Edward Island has more hens and chickens per family than any other province, and she has held this proud pre-eminence for years. She was away ahead of any other province in 1891, when she had 26·1 fowls to each family, and she maintained her lead. In 1901 she had 27·5 of these barnyard pets; though hard pressed by Ontario, which had 18 per family in 1891, and increased to 21·16 in 1901, and still harder pressed by Manitoba with 21·50 per family in 1901, increased to that number from 16 per family in 1891.

Nova Scotia has the least number of hens and chickens per family of all the provinces. She had fewer per family in 1901 than she had in 1891, in the latter year having 8·45, and the last census only 8·25.

Canada secures from the poultry yard a yearly return equal to $14.13 per family. The eggs yield a value of $9.60 every year, the poultry killed or sold for export a value of $1.28, and the sum of $3.25 represents the value of hens and chickens in active business.

The banner province in this respect is again Prince Edward Island, with a total of $20.69 per family closely followed by Manitoba with $17.74 and by Ontario with $16.50, while Nova Scotia follows in the rear, with but $8.39. The province of Quebec has but $9.84.

While Ontario's hens lay an average of 93 eggs a hen, and Manitoba's 83, and Prince Edward Island's 85, and Quebec 91, and New Brunswick's 86, Nova Scotia's hen lays 108 eggs in the year.

If everybody goes into chicken raising and egg production, where will we all get a market?

The home market, with a production of 84,000,000 dozens, our Canadian consumption was last year not fully supplied. In 1902 we exported 12,000,000 dozens and had, say, 72,000,000 dozens for home consumption. We needed quite a number to put under the hens and into incubators. But we had probably an annual home consumption of 68,000,000 dozens, say 12 dozens, making allowance for addled eggs, per head of the population. That looks large. But it is not one egg in two days for each person, and then consider how much eggs enter into daily use in household cooking, in confectionery shops, bakeries and other businesses, and in the arts and sciences.

The British Isles imported last year 198,500,000 dozens, Russia sending 68,000,000, Denmark 38,000,000, Germany 31,000,000, Belgium 23,000,000, France 16,000,000 and Canada 7,333,000 dozens. We sent fewer dozens last year than in the preceding year, though here again I note a compensation—while the average price of the 198,500,000 dozens was 16 1·5 cents per dozen, Canada's eggs had a value of 19 cents. We are being

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beaten by the Russian hens, who are contributing more and more to the wants of the British consumer.

Shall we let the Russian hen continue to carry off one-third of this enormous business, valued at $32,000,000 or $33,000,000 yearly, while we send but little more than one-twenty-eighth—Russia one dozen in every three, Canada one dozen in every 28? Perish the thought.

III. Location.—In building a poultry house a number of things should be taken into consideration.

(1) *We Must Allow for Growth.*—It is not well to build where, owing to the cramped condition, we can not extend as the work demands. In keeping breeding stock we must give them plenty of room if we wish to get the best results.

(2) *Convenience.*—So many houses are constructed with apparently no idea of this. In this time of high-priced labour it is quite necessary that we have our buildings located not only near the house, where they can be easily reached, but also near our feed rooms and near the water supply, and have the buildings internally arranged with this in view. The roosts and drop boards should be constructed so that they are easily cleaned. In fact, all the internal fixtures should be made movable, thus facilitating the frequent cleaning the house must necessarily get. Filth and its companion, vermin, cause more mortality than all other agencies combined. Convenience reduces the labour of cleaning to a minimum. When the habit is once formed of cleaning the poultry house as regularly as the horse and cow stable, the work is comparatively light.

(3) *The Location Must be Dry.*—This is the most important point in locating our poultry house. If it is not dry we had better discard it at once or provide measures to make it dry. Thus in choosing our locality it is well to place our buildings where no water will cause dampness. A gentle slope to the south or southeast is very desirable, and protection from the north wind. Do not place the buildings in a hollow where water will back up. The floor of the building should be at least several inches above the highest surrounding soil. To insure sufficient dryness, a gravelly soil is best. Soil for the yards that will raise nothing else is not the most suitable. Such a soil may be sufficiently dry, but laying fowl require in the runs not only room but vegetation. A plot of fresh alfalfa pasture gives better results for a yard than ten times the size where nothing will grow. Shade in the run is very essential.

Nothing has been said in reference to the market, as most farmers are already permanently situated, but persons who are looking for a location should, other things being equal, settle as near as possible to their market, not only to save freight and express, but to get the produce on the market in the best possible condition.

IV. Essentials.—The essentials of a poultry house may be summed up briefly under sunlight, fresh air and warmth.

(1) *The Sun is our Best Disinfectant.*—The windows of the poultry house should be so arranged that the sun will see all the floor space during the day. Windows should come to within 2 feet of floor and extend to the same distance from peak, large enough to contain about one-third front of house. If there is a curtain before the roosting quarters, it should be lifted during the day and the sun allowed to penetrate every nook and corner of the roosting pen.

(2) *Fresh Air* is very essential for the laying stock. Houses should not be built to admit the fresh air through cracks, forming draughts, but admitted so that the air can be changed in the house at will. One of the best ways of accomplishing this is to have the windows so arranged that they can be opened every day. In the winter an hour or less would probably be sufficient, but it is essential, even in cold weather, to allow the house to be purified by ventilation. For this purpose a number are using burlap screens which give good satisfaction. Some of these plans show also what is called the open scratching shed, where nothing but screen wire is between the outside air and the fowl as they are exercising during the day. Ventilating shafts have not given the best satisfaction. Where the burlap curtain or the open scratching shed is

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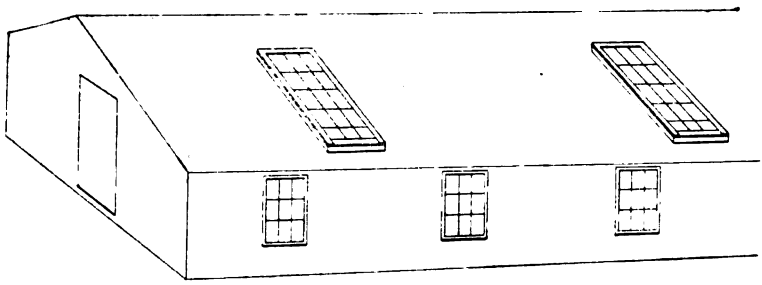
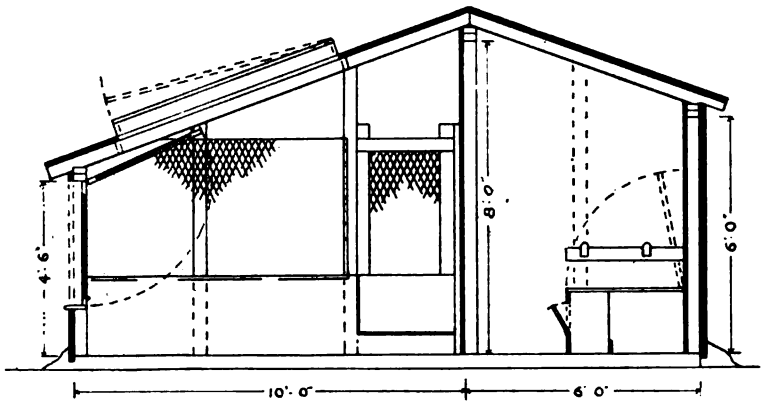
not used, a small opening, say a foot square for every 12 hens, is sometimes made over the window or near the roof towards the south, and in this opening is placed a cotton or burlap screen, a similar opening may be made beneath the window, this arrangement allows a moderate change of air continuously.

(3) *Warmth.*—It is not meant that poultry houses are to be built warm, nor artificially heated, but simply that they are to be built so that the fowl will be comfortable. No animal can do its best if it is uncomfortable. Aim to keep the temperature as even as possible day and night. For this purpose it will be necessary to contrive some simple arrangement that will substitute during the night the heat that the sun and exercise provide during the day. To allow the fowls to roost in the same pen they have been exercising in during the day, without any extra covering, is not wise. It is not the cold days, but the cold nights that keep hens from laying. Then if they can be made more comfortable at night by means of the burlap curtain or the board partition, or anything else, let it be done. The up-to-date farmer's poultry house is one with plenty of room, light and sunshine, fresh air without draughts, movable fixtures, convenient, built for comfort according to modern plans to suit his purse.

No. 1.—DOUBLE HOUSE.



GENERAL VIEW



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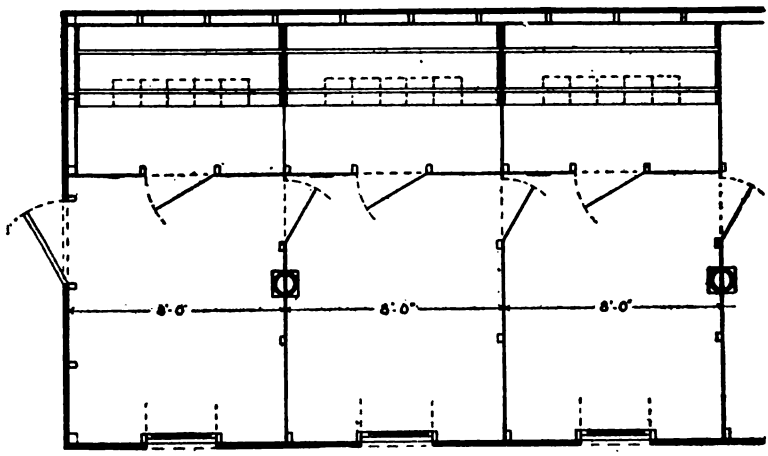
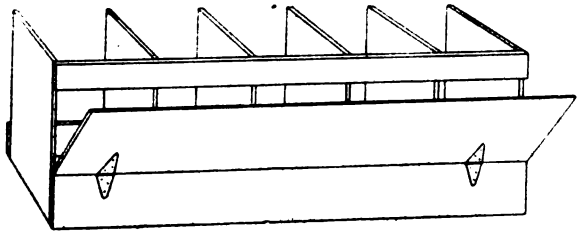


PLAN.



THE NESTS.

Illustration No. 1 is the double house used by the Department of Agriculture at a number of the poultry stations. The sloping roof to the south contains a skylight for every two pens. Each pen is 8 x 16 feet, and the building is divided by a partition running from end to end, 6 feet from the north wall, thus forming a roosting pen 6 x 8 feet at the north side, and a scratching pen at the south 8 x 10 feet. A door opening into the roosting quarters may be closed on cold nights. The two roosts are placed 10 inches above the drop board, which is 3 feet wide, and underneath are the nests which allow an opening at either end for the hens to enter the nests from the rear. The eggs are taken from the nests through a door immediately under the front edge of the drop board. The north side of the building and the ends north of the entrance doors are sided with three-ply boards and two building papers, the rest two-ply board and one paper. The roof one-ply board, paper, and shingles.

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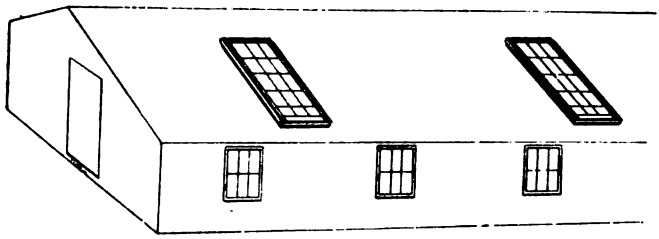
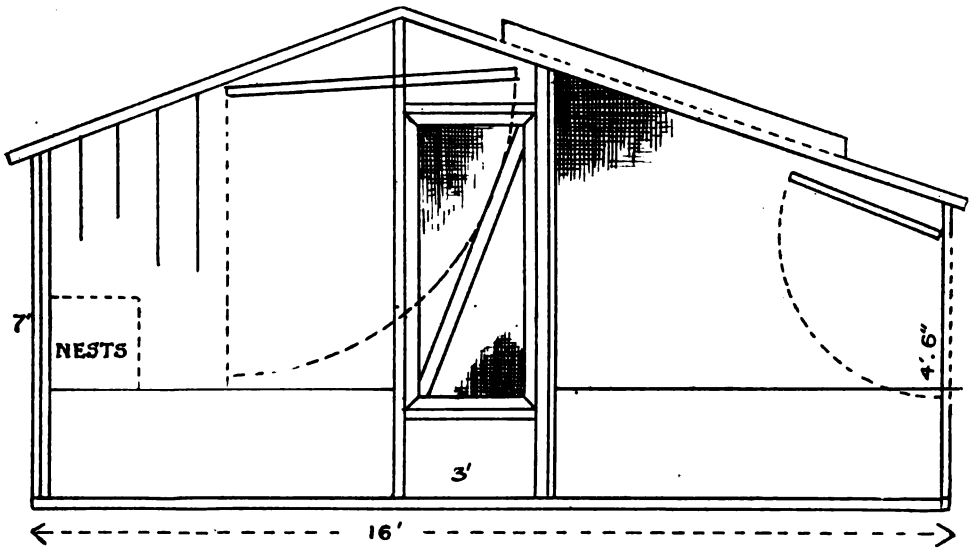
No. 2.—STRATFORD HOUSE.



GENERAL VIEW.



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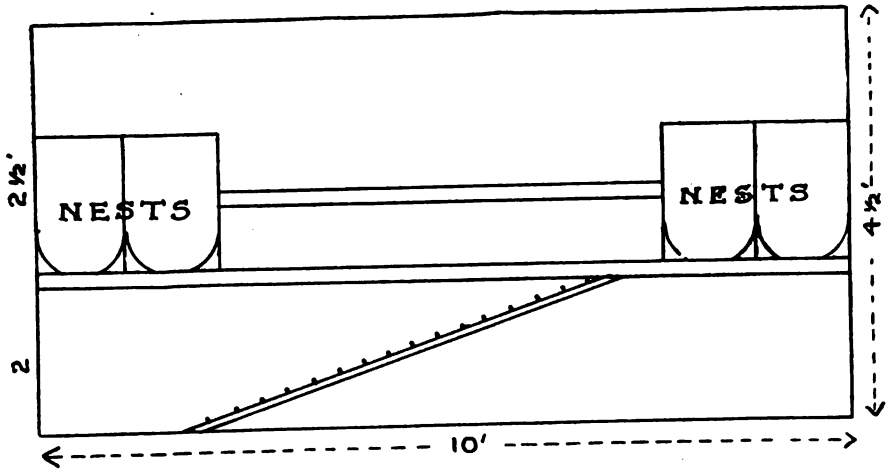

REAR VIEW.

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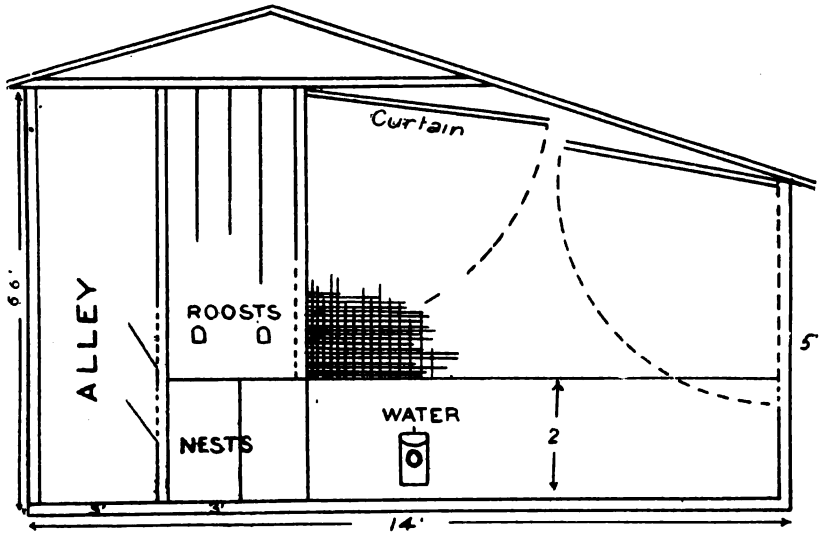
No. 2 is the plan of a house used by the Canadian Poultry and Produce Company, Stratford, and is built after the exterior plan of No. 1. Some alteration appears on the interior. The dividing partition is done away with, in place of which a curtain is dropped from the ceiling, immediately in front of the roosts, which provides warmth on cold nights. The nest boxes are placed on top of the drop board. The siding is the same as No. 1.

No. 3.—TRURO HOUSE.



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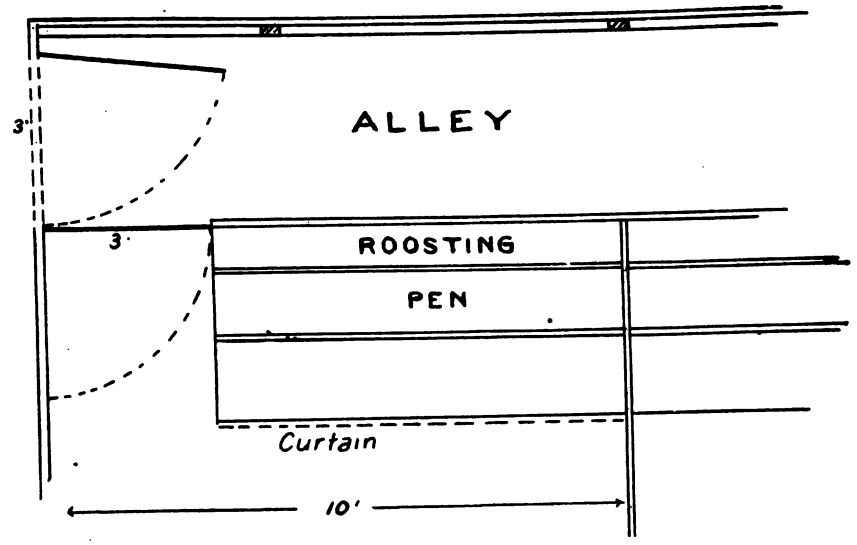

PLAN OF ALLEY AND ROOSTING PEN.

No. 3 is the plan of house used at the Truro (N.S.) Agricultural College. It has the double roof of 1 and 2, minus the skylight. The distinguishing feature, however, is the alley way, which runs the entire length along the back wall. From this passage the drop boards are cleaned and the eggs collected. Sided same as No. 1.

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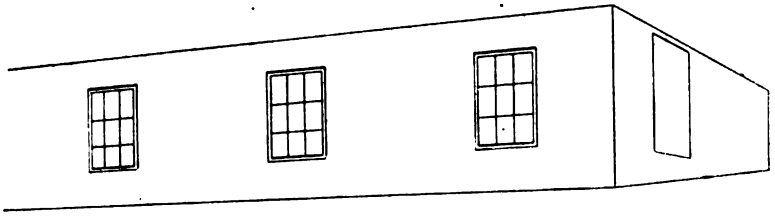
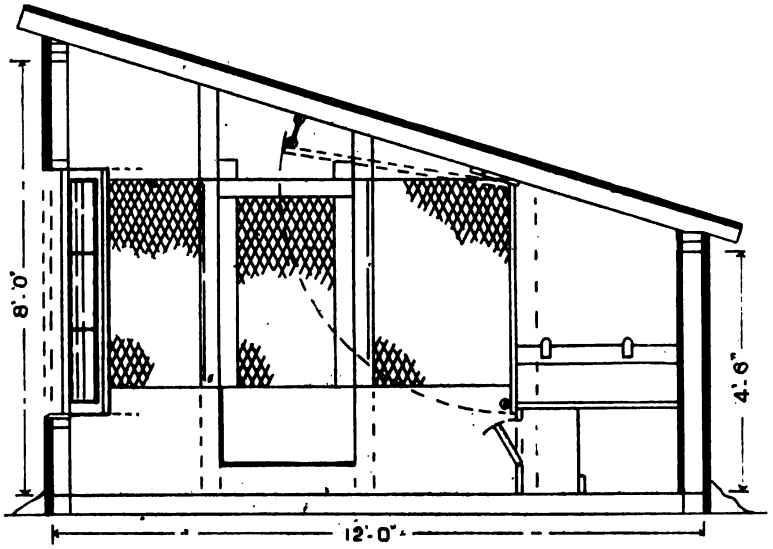
No. 4.—SINGLE HOUSE.



GENERAL VIEW.



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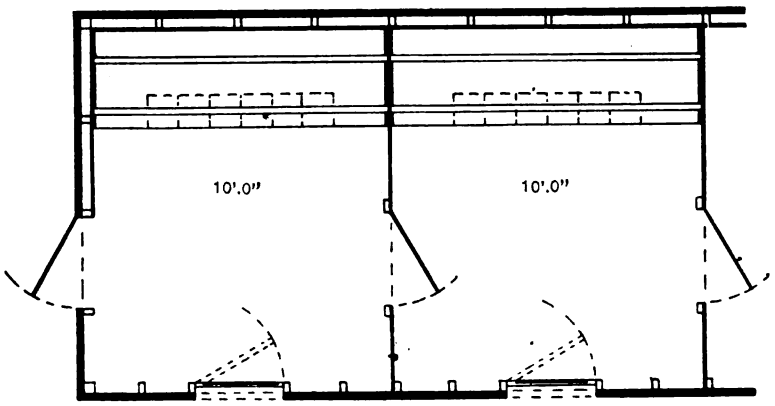

PLAN

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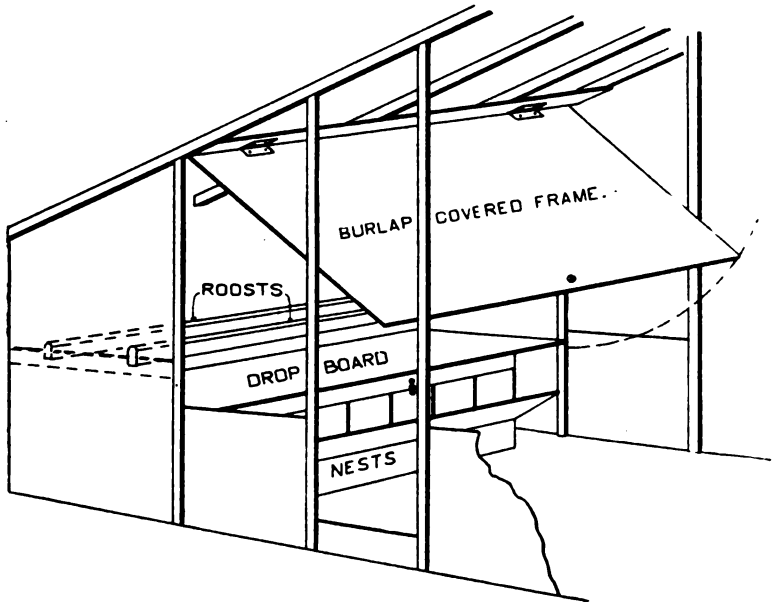
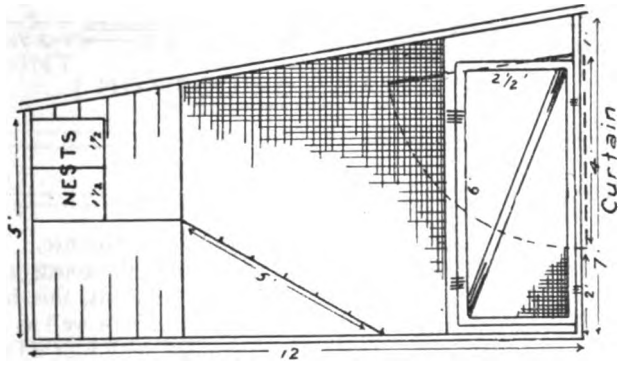


ROOSTS AND NESTS.

No. 4 is the plan of the single house used by the Department of Agriculture. The dividing partition of the double house is replaced by the drop curtain. The arrangement of the roosts and nests is the same as No. 1; pens 10 x 12 feet. This is also sided the same as No. 1.

No. 5.



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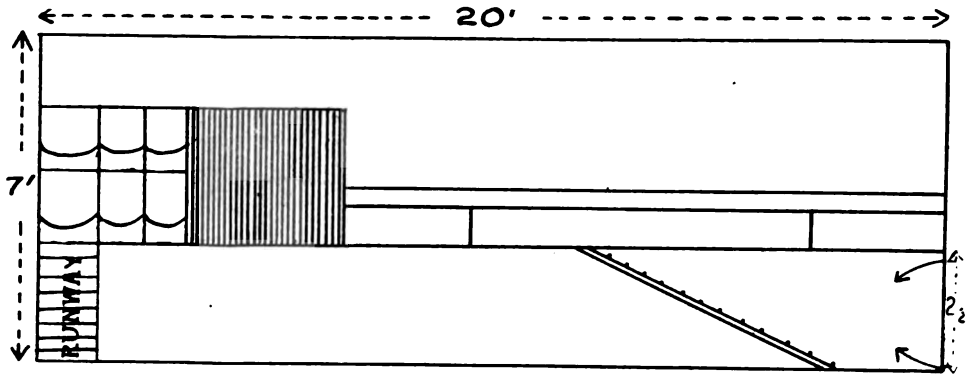
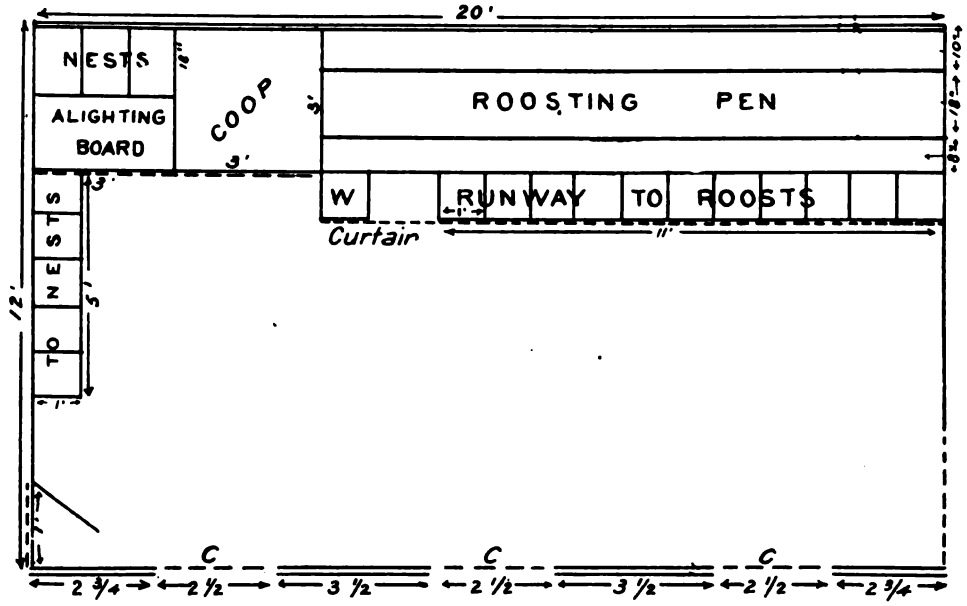


REAR VIEW.



(C CANVASS OR COTTON)

PLAN OF ONE PEN.

No. 5 is a plan of the house used by L. H. Baldwin, Toronto. The pens are 20 x 12 feet and over the drop board is placed, in addition to the roosts and nests, a coop for males or brooding hens. Instead of the windows in front, this house has canvas covered frames, hinged, which allow the free admission of air as well as light. They can be opened in favourable weather. This house is sided and roofed with rough inch boarding and Ruberoid roofing. The inside of the north wall, and the ceiling as far as the coops, are sheeted with tongued and grooved material.

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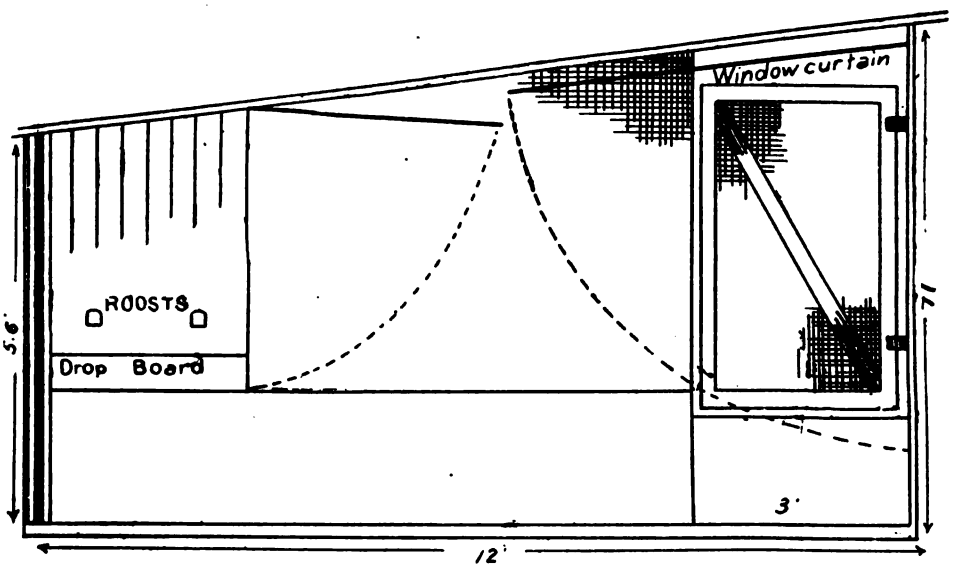
No. 6.



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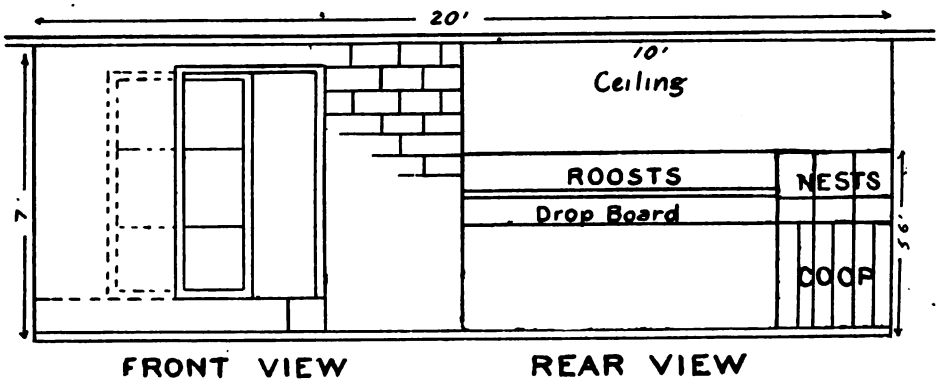
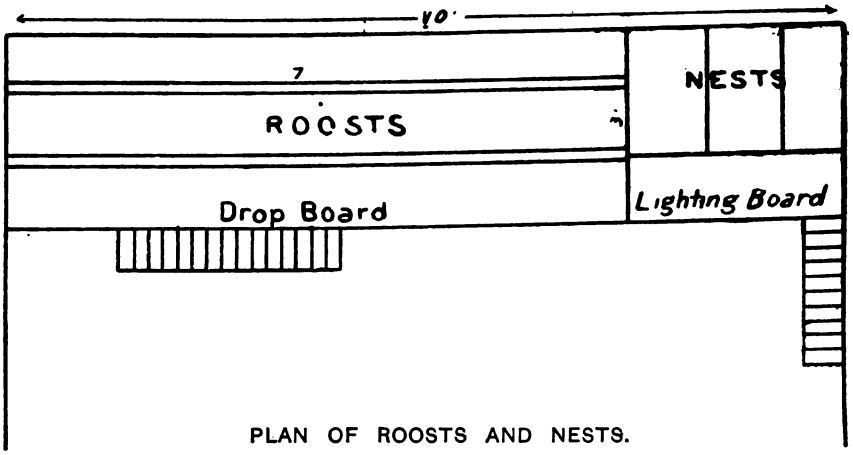


FRONT VIEW REAR VIEW



PLAN OF ROOSTS AND NESTS.

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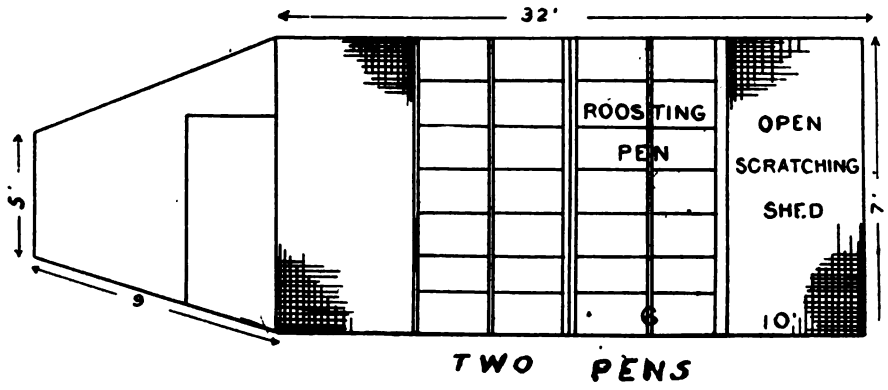
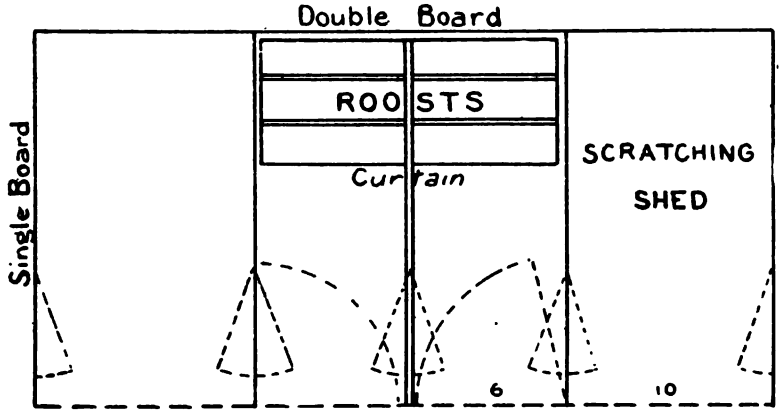
No. 6 is the plan of house used by J. W. Clark, Cainsville. It possesses both the window and the curtain front. The window slides back and in place of it a cotton screen can be let down to fill the opening. The pens are built 12 x 13 feet, and it will be noticed by the sketch that the coop in this house is placed beneath the dropping board. The house is sheeted with rough boards, paper and cheap shingles on outside. The north side has an additional ply of paper. The inside is lathed and plastered.

No. 7.





PLAN OF TWO PENS.

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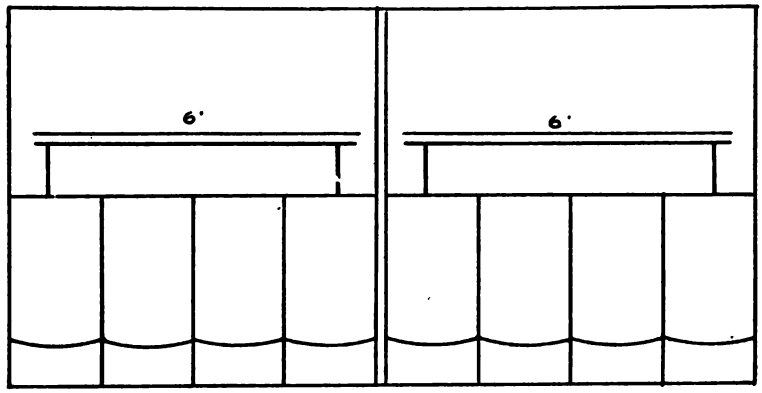

ROOSTS AND NEST BOXES.

No. 7, used by J. Bedford, Toronto, is very simple and the most cheaply constructed in the lot. It has an open scratching shed with a closed window front roosting pen. This house is single boarded, battened, with an additional ply of boards and paper immediately behind at the end and top of the roosts, as shown in the plans. The scratching shed is 9 x 10 feet; the roosting pen, 6 x 10.

These houses may be built with or without a foundation. A cement or stone wall sufficiently underground to exclude rats and vermin is an advantage. The cost varies according to the price of lumber and help. The floor in most cases is the soil, though cement or wooden floors will give good satisfaction. The different plans are given to suit different conditions. One or two main ideas prevail throughout; viz.: Warm roosting pens, plenty of sunlight, fresh air without draughts and convenience in cleaning. All the houses from which these plans were taken have given good satisfaction.

In calculating the number of fowls these buildings will accommodate, allow six to eight square feet of floor surface for each breeding fowl and give them from five to ten times as much yard space. For each pen one male will be found sufficient, but it is sometimes advisable to change the male if not specially mated.

The pens in No. 5 house are about as large again as those contained in the other houses. Two males are kept for this, but are confined on alternate days in the coop for the purpose.

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DEPARTMENT OF AGRICULTURE

LIVE STOCK COMMISSIONER'S BRANCH

POULTRY DIVISION

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F. W. HODSON
Live Stock Commissioner

F. C. ELFORD
Chief of Poultry Division.

DISEASES AND PARASITES OF POULTRY

BULLETIN No. 9

PUBLISHED BY DIRECTION OF THE HON. SYDNEY A. FISHER, MINISTER OF AGRICULTURE, OTTAWA, ONT.

MAY, 1905

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OTTAWA, May 1, 1905.

To the Honourable
The Minister of Agriculture.

SIR,—I beg to transmit herewith bulletin 'Diseases and Parasites of Poultry,' by F. C. Elford, Chief of the Poultry Division, and to recommend that it be printed for distribution.

I have the honour to be, sir,
Your obedient servant,

F. W. HODSON,
Live Stock Commissioner.

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DISEASES AND PARASITES OF POULTRY.

THE DISEASES OF POULTRY.

1. Treatment of Poultry Diseases.—The treatment of poultry diseases should seldom concern the farmer. If the healthiest and most vigorous breeding fowls are kept, the chickens reared under satisfactory conditions, fed on wholesome food and not overcrowded, and the buildings kept thoroughly clean and disinfected, there will rarely be disease among them. When disease does appear, it will usually be found more satisfactory to kill and bury the sick birds than to treat the disease.

The poultry houses should be thoroughly cleaned out and disinfected by the use of a good spray pump. A good spray mixture may be made from a 2 per cent solution of chloride of lime or creolin or carbolic acid. Spray every square inch of everything inside, roof, walls, roosts, nests, &c. Close up and allow the fumes to act a few hours, then open and ventilate.

The poultry yards, if situated so that they cannot be ploughed and cropped, should be treated with unslaked lime dust. Scrape the yards clean of manure and refuse, scatter the lime thick on the ground, then sprinkle the lime with water from the spray pump. This will slake the lime and cause it to destroy any germs of parasites in the soil.

2. Causes of Diseases of Poultry.—The most troublesome diseases of fowl, with their causes, may be summed up as follows:—

Roup.—Planted by 'only a neglected slight cold.'
Cholera.—Caused principally by overcrowding.
Diarrhœa.—Damp houses, filthy houses and runs, and bad feeding.
Canker.—Dampness and filth.
Diphtheria.—Roosting in draughts, damp houses.
Ulcerated Throat.—Ditto.
Consumption.—Neglected cold.
Apoplexy, Vertigo and Epilepsy.—Overfeeding.
Sore Eyes.—Damp houses.
Costiveness and Constipation.—Improper food.
Soft and Swelled Crops, Indigestion and Dyspepsia.—Overfeeding.
Pip and Bronchitis.—Damp quarters.
Black Rot.—Result of indigestion.
Soft Eggs.—Overfeeding.
Gout, Rheumatism and Cramp.—Damp houses.
Leg Weakness.—Inbreeding and overfeeding.
Bumble Foot.—High perches.
Scaly Legs and Chicken Pox.—Filthy and damp quarters.

3. Gapes.—*Poultry*, of London, England, says: We have of late had many inquiries as to this ailment, so give our reply prominence. Gapes is a disease of youth, and attacks adults as seldom as the whooping cough attacks old people. It generally makes its appearance when the chickens are between four and eight weeks old, and rarely, if ever, has it been known to attack birds over four months old.

It is not a new disease, but one that has been known in connection with poultry, partridges, pheasants, and other birds for centuries. Opinions differ as to the actual origin of gapes, but there is no doubt as to the symptoms nor as to the exciting cause of the symptoms.

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Symptoms.—The chicks are observed to open their mouths to the fullest extent, and 'gape' and have a short choking cough. Later on the cough increases in frequency, the gaping becomes almost constant, and the chick ultimately chokes and expires.

The cause of the distress is the presence of red worms at the root of the windpipe. When they first come they are very small (not larger than a thread), and have a bright, almost a vermillion, colour. They have, however, been taken out of chickens so large as almost to fill the windpipe half of its length. Two worms—a longer and shorter one—are frequently found joined together, the point of junction being about the middle of the longer worm. The largest worms are about the thickness of a stout pin. They are very active, and it is the tickling caused by their constant motion that causes the short dry cough and the gaping, in the futile endeavour to get rid of the pests.

Treatment.—There are divers cures and operations, but wherever the disease appears some chickens always die, and it would be well, before operating on the others, to open and examine the windpipe of one of the dead chickens yourself. If the disease that has caused death is gapes the worms adhering to the mucous membrane of the windpipe will be seen; but if these are not present then death has been due to some other disease.

The original treatment recommended and followed by those, who, generations back, gave the disease its expressive name, was to take a hen's feather, stripped within an inch of its extremity, to place it down the windpipe, twist it sharply round, and withdraw suddenly. We have followed a similar plan to this when operating on turkey poults and strong chickens. We have found it advantageous to moisten the feather in spirits of turpentine before using it. The turpentine kills the worms—the feather must only be moistened, not soaked, with it, as a drop going into the lungs may be fatal to the chick—and the operation causes the bird to sneeze, and throw them up; that is, we may add, if performed by an old hand.

A difficulty is sometimes experienced by novices in getting the feather down the windpipe, but by holding the chick's beak open with the finger and thumb of the left hand applied from behind and pressing the throat of the chick slightly with the other fingers of the same hand, the opening of the windpipe can be clearly seen just behind the tongue, and down this the feather must be gently pushed as far as it will easily go.

Another method is to pass down horsehair loops, twist them, and withdraw them. But neither of these methods is very effectual, as it always leaves some worms behind, and they increase and multiply. The operations, too, have to be performed with great care, as the feather is often put down the gullet, which is useless, and with small chickens, which are most seriously affected, it is altogether out of the question.

Still other methods of cure that are recommended is to place the chicks in a box of chips soaked in turpentine, or to give them a little piece of bread with some turpentine on it. Carbolic acid fumes are also advised by some . The best plan of managing the administration of these is to confine the chicks in air-tight house or large box, and place over a small petroleum stove, an old kettle or other similar vessel with about one-fourth part of crude carbolic acid and three parts water. The boiling fluid will give off a strong carbolic vapour, and cause the chicks to cough violently. This process, however, requires careful supervision, or the carbolic fumes may become too powerful for the chickens, and they may succumb.

On this account a cure was required that could be used without interfering with the windpipe, and would also be simple and effectual. It could only be done by using something sufficiently powerful to pervade the system, and to reach by its odor both the seat and the cause of the disease. Nothing that we have used have we found to do it so effectually as camphor, given in pills of the size of a grain of wheat at intervals. That which is given to a fowl or pheasant must of necessity remain some time in the crop in close proximity to the windpipe. As soon as the odor reaches the worms they die, and the disease ceases with their death.

Whenever premonitory symptoms are observed immediate action should be taken. They may often be arrested by giving the birds no other water to drink than that which

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is strongly impregnated with camphor, known to our grandmothers as 'camphor julep,' and believed to be a panacea for most disorders, and, more than that, a preventive. Another good thing to put in the water in the place of camphor is as follows: Dissolve 2 oz. of sulphate of iron in sixty drops of sulphuric acid. After it has stood twenty-four hours mix it with two gallons of water. Let it stand two days, and then administer it by putting a teaspoonful to a pint of water.

It is thought, and we agree with it, that these parasites are gained by drinking bad water. All fowls prefer drinking from a puddle of dirty rain water to any vessel or clean spring water. The opportunity should not therefore be afforded them. Scrupulous cleanliness with a liberal use of disinfectants (such as carbolic powder), and the separation of the affected chicks from the others, are the only means of prevention.

The ground is said to become tainted with the germs of this disease, so it is as well, where possible, to avoid putting chicks where those gapes have been. Old birds do not catch it; chickens recover if they can outlive the worms.

In Canada it is believed, gapes are usually due to filth, the eating of the residuum of food previously given, and feeding in damp places. It is believed that they are propagated in earth worms, but no facts have yet been discovered regarding such claim. The best remedy for gapes, if the chicks will eat, is to add a teaspoonful of spirits of turpentine to a mixture of one pint corn meal and a half pint of middlings. Thoroughly incorporate the turpentine with the dry material, then scald as much of the material as may be required, and feed to the chicks on a clean board. Put ten drops of carbolic acid in every pint of drinking water, and change the water frequently. There is no sure remedy for gapes, and inserting feather tips in the windpipe to draw out the gape worms can be done only by an experienced person. There are suggested remedies, but they are sometimes as fatal to the chicks as the gapes.

A little spirits of camphor rubbed on the outside of the throat and a few grains of the gum administered internally will sometimes give relief. Where possible, the ploughing the runs deeply every spring and sowing to rye and repeating the operation about September 1st, acts as a preventative. Where the yards are so situated as to make ploughing impossible they should be cleaned and spaded frequently.

4. Bowel Trouble in Chicks.—If a chick is strong enough to break the shell, it is strong enough to live if it gets half a chance. I would not give a penny for a chick that was hatched on the 22nd day, nor for a chick that must be helped out of the shell. No care can save them, not even a hen. A chick should pip the shell on the 20th day, and be hatched on the morning of the 21st day. I have followed nature for years in this respect, and have made it a study, says Mr. J. Sontag, in the *American Poultry Journal.* Continuing he says:—'We will suppose that the chicks leave the shell in the incubator on Sunday. We allow them to remain there until Tuesday morning, when they are taken out and placed in a brooder. On the brooder floor I always keep two inches of sand; the chicks will eat the sand like wheat, and when they are 60 to 70 hours old I feed them their first meal, and I desire to call special attention to the fact that they are 60 to 70 hours old before they are fed. Nature has provided for the chick for from four to six days by furnishing the yolk of the egg. To demonstrate this take a five to six day old crippled chick or one which can be killed without loss and you will find the yellow of the egg in the stomach. This proves that just as long as a chick has this it will live, and it will not starve or even be hungry.

The cause of so many chicks dying and having bowel trouble is indigestion; they are fed too early. This I can prove to you in a half dozen different ways. Why do not the chicks have bowel trouble when running with the hens and looking for their own food? Why are birds in a wild state not troubled in this manner? They get their food often and a little at the time; it is a seed here and an insect there, and so until at night their crops are full of nature's food.

I have lost as many chicks as any large breeder in America for the last fifteen years and have tried all kinds of food, and have experimented upon how much to feed and when to feed and what kinds of food are the most suitable.

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When the chicks are 60 to 70 hours old I let them out in the grass and sprinkle dry bread crumbs amongst them; in about an hour I give them a little dry oatflake; I give them just a little of that and they will run around over the grass looking for insect life. They seem to find food material of this kind which is not visible to us. About two hours later I give them a little millet seed and grass seed mixed, then in about three hours, or at night, I give them fine cracked corn, not corn meal, but cracked corn and milk that has been boiled; boiled milk and milk curds are the best preventive of bowl trouble. I give them milk until they are ten days old; some prefer milk in water, but if water is given it should be warm. The next day at 6 a. m. I give them Johnny cake, about three hours later I feed them cracked wheat. At each meal except at night they are given about a half crop full, and at night a full crop; never give them a crop full of feed at any other meal, and never feed the same food twice the same day; change at each meal and give a little at each meal; then you are following nature. One-third crop full is a great deal better than a full crop. A hungry chicken is always a healthy one.

When a chick is weakly, hangs its wings, stands listless and is slow in walking and in fact seemingly blind to the world, it is suffering from indigestion, and the cause can be put down to overfeeding and too early feeding after having been taken out of the incubator. The chick in some respect resembles a baby. If an infant is fed for the first meal meat, potatoes and pastry of all kinds, it will not live long, because it is not nature's food, and this same rule applies to the chicks; they should have a little of everything and very little of anything. This method we believe is a successful one without any doubt.

Allow them to run out on the grass as soon as they possibly can, and when six days old give them free range.

Keep the heat in the brooder at 98 degrees two inches from the floor and keep it at about that point until the chicks are full feathered. Most breeders reduce that heat one or two degrees each day until it is about 70 degrees. I fail to see any good reason why this plan should be followed.

A hen when she broods her chickens has a temperature of 98 degrees, or blood heat. We believe it is not more necessary to reduce the heat in a brooder than it would be in the case of the hen, as she broods the chickens when they are six weeks old. If your brooder is arranged like mine the chicks can go where they like, as regards the temperature. They will find it from 70 to 100.

We advise against mixing grit in food and against feeding mash. A fowl has a gizzard and grinds its own food and when the gizzard is idle the engine of the chicks stops and finally the stomach gets out of order. Mash food has caused more diseases than any other one thing. In the first place it is not natural; the gizzard must keep grinding food, and if mash is fed the food passes through without being ground. The chick also overeats and suffers from indigestion.

There is much in the kind of heat in a brooder as well as the amount. A brooder should have a natural heat and not a hot dry one; there should also be fresh air coming and going at all times in the hover. If you will examine the chicks found dead in the brooder you will find their legs are all dried up. The hot dry heat has this effect on the blood and lungs, as a hot air furnace does upon furniture, &c. This kind of heat is not healthy for man or fowl.

On rainy days the brooder should be inside for chicks that are only two weeks old so as to keep them dry. They should be given the run of a large room, for keeping them locked up in a brooder will play havoc with them. There should be an in-door brooder for this purpose until chicks are 18 days old, and they should then be put in an out-door brooder, as they are old enough to help themselves.

Other Chick Troubles.—If a chick appears weak, or has weak legs, from rapid growth, put a teaspoonful of citrate of iron and ammonia in each quart of the drinking water. Sometimes two drops of tincture of nux vomica in a quart of water is excellent.

Lice on Young Chicks; Look for them.—When your young chicks are two or three days old, examine their heads for head-lice. They are big, brown fellows and will be

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found anterior downwards, getting a living out of the heads of their prey. If your chicks are 'hen-hatched' you will almost be sure to find them; if incubator-hatched, less likely so. Lard rubbed well on the top of the head will soon kill all the lice there and will also prevent their appearance. At the same time dust well the mother hen and if this is done and runs kept clean, you will not be bothered with lice, but it will be well to examine the chicks at least once a week to see that all is right.

5. Rheumatism and Cramps.—Rheumatism is an inflamation of the joints accompanied by swelling, stiffness and pain when walking is attempted. Hock joints are usually hot and swollen. Bird squats in out of the way places, does not eat and mopes, apparently suffering great pain. The disease is more frequent in damp locations. It is probably hereditary and the result of breeding from debilitated stock.

Cramps in chicks are probably a form of rheumatism, affecting young chicks and due to similar causes. Among the predisposing causes are over-heating in the brooders, brooding on a smooth board floor, lack of sufficient ventilation, exposure to dampness and all conditions of bad hygiene.

Treatment.—Feed an abundance of succulent food, a small amount of animal food or meat, and all the meal in the form of dry grain. In the drinking water use 6 to 12 granulus Rhus Tox 3x in each pint of drinking water.

6. Diarrhœa in Small Chicks.—Diarrhœa in small chicks or pasting up behind may result from many causes. It is often due to breeding from debilitated stock or to errors in incubation. It may be caused by chilling, over-heating or improper feeding. Half a dozen tablets of mercury bichloride 3x or nux vomica and sulphur comp. 2x mixed in a pint of drinking water and feeding a little charcoal with daily food will usually remedy the trouble. Change the method of feeding. Try feeding johnny-cake. Find the cause of the trouble and remove it if possible.

7. Indigestion.—Indigestion is a disorder affecting the entire digestive system, the crop and intestines. It may result from general debility, but it is usually caused by improper feeding or over-feeding or feeding condition powders and condiments in excess. Lack of grit, feeding too much soft food, insufficient variety and lack of green food are all causes. Any part or the whole of the digestive system may be affected.

Symptoms.—The more common form is a disorder of the crop, known as soft or sour crop. The crop is distended and full of food and a thick fluid which has a foul odor. The stringy food falls from the bird's mouth whenever the head is lowered to pick up bits of grain. The bird drinks frequently, has very little appetite and is inclined to be dumpish. Other common symptoms of indigestion are lack of appetite, diarrhœa one day, constipation the next and a tendency to loaf about the poultry house, in a corner or on the roost, instead of scratching in the litter for grain.

Treatment.—When the bird gets in this condition (which should not be permitted, as it can usually be avoided by giving them good care), the poultry house should be cleaned up, the litter renewed with fresh material; all food should be dry, hard grain fed in the litter. Mash and other wet messes should not be given. A limited amount of fresh, green food may be fed, the grit box should be kept full of good grit and shell. In the drinking water use twelve tablets of nux vomica and sulphur comp. 2x to each pint of drinking water. Continue the treatment until the fowls are in good condition.

8. Limber-neck.—This is due to disorder of the nervous system. The bird's neck appears limber and hangs downward, the bird is unable to raise its head, the neck may be turned back upon the body. It is usually the result of reflexes caused by disturbances of the digestive organs from severe attacks of indigestion or from worm parasites.

Treatment.—Give the bird a small piece of gum asafoetida about the size of a split pea. Repeat the dose the next day. This will prove effective in many cases, or feed the bird bruised garlic bulb freely, mixed with bread crumbs.

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9. Egg Eating.—Egg eating is a bad habit which is the outcome of overcrowding, lack of exercise and the use of nests opened to the light. The birds scratch in the open nests and break an egg or two, or find a broken egg under their roosts; they eat it, and this starts the habit. The only remedy is to use dark nests and leave a few china eggs lying about the floor for the birds to pick at; after picking at the china eggs for a time without obtaining any results, they soon cease picking at the egg in hopes of getting a dainty tit-bit. Egg eating is a difficult habit to cure, the hatchet is the most effective remedy.

10. Roup.—Roup attacks fowls in various ways; the most reliable sympton is noticed while the fowl is at roost, and consists of a rattling noise which sounds like water thrown on coals of fire. The noise is caused by the fowl breathing through the windpipe and nostrils, which have become clogged. An offensive odour is noticed and a discharge at the nostril started; this in a few days becomes hardened so the fowl can breath only through the mouth. In other cases the rattling only is noticed and no discharge at the nose. One of the surest methods is to see if the odour is present and to look at the roof of the mouth where in nearly all cases of roup a yellow, offensive deposit is noticed.

Roup is one of the highly contagious diseases, and is mostly communicated to healthy birds by the medium of the drinking trough. One sick bird will by this means infect a whole flock. The disease is easily recognized, as the bird's head swells and a foul discharge proceeds from the eyes and nostrils. When the disease has made great headway it is safest to kill the bird, because a disgusting fungus has grown in the throat, giving rise to the term 'diphtheric roup.' It is then very dangerous and is communicable to children.

Treatment.—Isolate the affected birds; disinfect all their roosts, nests and houses; destroy or at least thoroughly cleanse with disinfecting fluid all drinking and feeding utensils, and for some time afterwards add a little Stockholm tar to the drinking water. As for the affected fowl, bathe their heads frequently with hot water and Condy's Fluid. Use a syringe to clean the nostrels and throat, injecting a solution of bluestone and warm water, sufficient bluestone to turn the water pale-blue. Be sure to prevent the bird swallowing any quantity of this, as it is a poison. On first observing the symptoms of roup, give the bird a dose of Epsom salts. Afterwards the best treatment is a pill containing two grains of quinine morning and night. The only certain way to prevent the re-appearance of disease is to kill the affected birds and thoroughly cleanse and disinfect the houses and runs.

Another Cure.—Take a small quantity of glycerine and put into it a couple of drops of essence of wintergreen. Pour this into the fowls' nostrils and in the throat. I find by experience that this is the best thing for roup or if the eyes are swollen or closed. Do not let the disease get too far advanced. Treat it at once. Use lime on the dropping boards. Keep charcoal and grit where they can get plenty of it. Then if they get roup or a bad cold they will not get diarrhœa, which weakens them so that they cannot be treated satisfactorily. A little ginger in the food is good.

11. Diseases of the Crop.—The crop may become subject to two distinct troubles: (1) Inflammation or catarrh; (2) Crop bound, in which the crop, failing to expel the contents, becomes obstructed with food and distended.

(1) In catarrh, the crop is distended but soft; sometimes the bird appears to be sick and vomits. By suspending the head downwards and applying gentle pressure on the distended crop, the offensive contents may be expelled through the mouth. After the crop has been emptied, administer two grains of subnitrate of bismuth and one grain of baking soda in a teaspoonful of water. Keep the bird without food for 24 hours and then feed only sparingly on soft food. Repeat the operation if necessary.

(2) For crop-bound, the following is recommended: Pour a little sweet oil into the mouth and cause the bird to swallow it. Then manipulate that portion of the crop

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nearest the throat by careful pressure and squeezing between the thumb and finger in such a way as to break up the contents of the crop and force it toward the mouth in small pieces. Suspend the bird head downward from time to time and press the loosened particles toward the head so they will escape. With care and patience the crop may be entirely emptied, if oil is administered as often as is required to soften contents. After this is accomplished, give two grains of baking soda. Keep without food for a day and then feed sparingly on soft food until recovered.

12. Cholera.—The cholera of domestic poultry is a virulent, usually fatal, contagious disease. It is caused by infection with the specific germ of the disease. It attacks all varieties of domestic fowls, and has been observed in wild birds inhabiting an infected district. The disease when it once makes its appearance in a flock that has free range is difficult, almost impossible, to control. Where fowls are kept in semi-confinement, the disease may be readily mastered if prompt measures are taken as soon as it is discovered. Infection takes place usually through food or drink which has been fouled by discharges of diseased birds. The germs also gain entrance to the body by the inhalation of dust in infected coops, which have not been properly disinfected, or through inoculation of wounds with the germs contained in discharges which have fouled the feet, claws and beaks of the birds. The blood and raw flesh of diseased birds will, if eaten by well fowls, transmit the disease to them. Pigeons, sparrows and wild birds may spread the contagion when the disease is present in a neighbourhood. The disease may be introduced by the purchase of an infected bird. Always be sure that a bird is healthy before you permit it to run with well fowls. Cholera makes its appearance in a flock in from a few days to nearly three weeks after infection with the germ. The length of time for its appearance and the severity of the early symptoms depend largely on the susceptibility and condition of the bird exposed to contagion and the virulence of the germ.

Symptoms.—The bird loses appetite, and is usually very thirsty; drinks water eagerly until it cannot retain the water in its crop, and spills it whenever its head is lowered. Bird has high fever, and if the bulb of a thermometer is held close to the flesh under the shoulder it will often register a temperature of 108 to 110 degrees. The crop is usually distended with food which cannot pass on, owing to the paralysis of that organ. The bird shows a disposition to sleep, bunches itself into a dumpy ball of ruffled feathers, with wings drooped, and avoids the rest of the flock. The comb is pale and of a sickly, yellowish colour; face and wattles appear bloodless, and the eyes are dull and almost closed. The bird loses strength and flesh rapidly. Frequently an attempt to move results in the bird falling, unable to rise again. Diarrhœa is always present. At first there is a slight looseness of the bowls; that part of the excrement which is in health pure white, becomes yellowish or yellowish green. Copious discharges of glary mucus follow rapidly, may be frothy and streaked with yellow and green. The droppings are voided frequently and vary from deep yellowish colour to a mottled green and yellow, becoming later a deep green. The excrement is thin, often frothy. The vent frequently appears raw and scalded by the excrement. Feathers about the vent are soiled and caked by the excrement. Death usually takes place in a few days after the appearance of the first symptoms. Some cases appear in a mild form, and merge into chronic infectious diarrhœa; all birds so affected should be killed and cremated. Examination of the body after death shows great wasting of flesh, pale face and comb, full crop, inflamed and discoloured intestines, liver greatly enlarged and soft and filled with dark blood, gall bladder distended, contents thick and dark greenish, kidneys and the small tubes leading from them are usually filled with yellow or yellowish-green masses.

Treatment.—Medicinal treatment for true cholera is of little value. The disease is so rapidly fatal that it is rarely discovered until too late to attempt treatment. The best treatment is to prevent the disease. Its spread in an infected flock may be prevented by prompt isolation of the sick birds, thorough disinfection of the runs and houses with a 5 per cent sulphuric acid solution, and the disinfection of the water.

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For disinfection of the drinking water and for general use as a mild, effective intestinal antiseptic there is no better poultry remedy than napcreol; use, according to the severity of the case, from one to two teaspoonfuls in each two gallon bucket of drinking water. No attempt to treat birds sick with cholera should be made unless they are valuable. For the safety of the rest of the flock, they should be strangled and cremated. No particle of the flesh or blood of the diseased bird should be permitted where a fowl may get it, and so become infected. After removing the sick birds from the flock, thoroughly disinfect the houses and runs. As a precautionary measure, use napcreol in the drinking water. In addition to this, give any birds showing a suspicious looseness of the bowels, though not apparently sick, a three-drop dose of spirits of camphor made into a small pill with bread crumbs and a little sugar twice daily for three or four days. Mercury bichloride 3x tablets are an effective remedy. Give one tablet three times daily or dissolve twelve tablets in each pint of drinking water.

The chief symptoms to depend on in diagnosing cholera are : (1) A rapidly fatal disease, accompanied by copious yellowish-green or deep green diarrhœa; (2) frequent discharge of excrement, pale face, comb and wattles; (3) sleepiness which may last until death, and which is ushered in with convulsions and piteous cries; (4) infection of a large number of birds in one flock.—(Dr. Woods.)

Sulpho-Carbolate of Zinc has proven a good preventative, and, in mild cases, a remedy, at several of the poultry stations. Dose—A teaspoonful to a gallon of drinking water, given to the flock, or those affected, for several days.

13. Entero-hepatitis or Blackhead.—This disease has been known for some years as a common and fatal disease of turkeys.

Symptoms.—There are no prominent symptoms by which the disease can be diagnosed during life, and it is only by the examination of the internal organs after death that the trouble is recognized. The disease runs a chronic course, and birds do not show signs of illness until just before death, when the pathological changes are so far advanced as to preclude medicinal treatment. These changes are to be observed in the liver and caeca. The caeca are two elongated blind pouches at the lower end of the small intestines. In the normal fowl they are of uniform diameter throughout, the walls thin and the mucus membrane pale; they are filled with a rather dry, greenish excrement. In entero-hepatitis one or both caeca have their walls greatly thickened, either throughout or in spots. The mucus membrane is deeply reddened and eroded, and from this inflamd surface there is poured into the caeca a quantity of creamy material or exudate more or less tinted with blood. The liver also shows marked alterations. It is enlarged and darkened, due to engorgement with blood, and scattered over its surface are round spots, sometimes whitish or again with yellowish tinge. These spots are so distinct that no one can fail to recognize them.

Prevention.—Isolation of the sick and disinfection of the houses occupied by the healthy. Particularly is it important to guard the young birds which are more susceptible to the contagion. It will therefore be best where the disease has been prevalent to remove the young to new quarters, whre the trouble has never before existed, rather than trust to the ability to completely disinfect the old houses and runs.

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II. LICE.

According to Dr. Woods there are nine varieties of body lice affecting poultry, but as they all look more or less alike to the average poultry keeper, we will not attempt to describe each variety separately. Each of the varieties has some favourite part of the fowl's body which it inhabits in preference to other parts and seldom trespasses on the domain of the neighbouring varieties. There are two of the nine varieties which are exceptions to this rule, and which are known as wandering lice; they are common to all parts of the fowl, being found more abundantly on the skin of the abdomen, among the fluffy feathers. These wandering lice not infrequently leave the fowl to attach themselves to persons who may handle the birds, or travel from one fowl to another on the roosts at night, and may even be found in the material or on the walls in badly infested buildings.

Lice do not, as is popularly believed, suck the blood of their victims. Their mouths are made for biting and chewing feathers and the scales of the skin. They are a source of much irritation to the fowl by their constant running about and scratching the skin with their sharp claws. Their presence will so worry a fowl and cause such irritation of the skin that the functions of the bird will be interfered with, and sickness may result if lice are in considerable numbers. It is also probable that these vermin carry infectious matter from sick fowls to well ones, and that they also may act as the intermediate hosts of worm parasites.

Lice may be rapidly spread through a flock by contact with lousy fowls; one infested bird being capable of distributing the vermin throughout a large flock. As the favourite seat of attack of the most common variety is in the downy feathers immediately about the vent, they may cause so much irritation and soreness as to result in indifferent or improper intercourse, and so result in infertile eggs. In young chicks they cause dumpishness, drooping wings, indifference to food, and if present in large numbers, may stunt or kill the chicks. Every adult fowl is more or less lousy, and we must not flatter ourselves that our fowls are free from them. It is a good rule to treat every fowl with suspicion, and examine it carefully for lice, as they are almost certain to be present in force when we least expect to find them. If you think a bird is not affected, carefully examine the feathers about her head, look under the large wing feathers next to the shaft, and then turn the fowl up quickly and examine the feathers and the skin below the vent; if your eyes and fingers are quick enough you will find them on every adult fowl you examine. The presence of one or two need not cause any alarm, but if a large number are found means should be taken at once to get rid of the vermin.

Prevention.—One of the best means of keeping this pest down is the dust bath. The dust bath should be 'dust' in name only. Fowls will wallow and dust themselves more often and to better advantage if they are provided with a wallow of soft, easily friable, slightly damp earth. This should be provided for them out-of-doors in some sheltered spot in the summer-time and in one corner of the house in winter. When fowls are exercising freely and seem to frequent the dust baths, or wallow and enjoy themselves therein at frequent intervals, there will seldom be a dangerous number of lice present.

Treatment.—Dusting fowl with a good lice powder that contains a considerable percentage of tobacco dust is an effective means of getting rid of vermin, but it is too tedious to use where a large number are to be treated. A good liquid lice-killer is an efficient means of fighting lice, and is easily used.

Two good dusting powders can be made as follows: Add one-half an ounce of 90 per cent carbolic acid to a peck of freshly air-slaked lime and stir thoroughly; or take

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sifted coal ashes, one-half peck, four fluid ounces of any good light liquid lice killer, mix thoughly, and then add tobacco dust bulk for bulk. In using dusting powders, they must be thoroughly worked into the feathers, down to the skin, if they are to be efficacious, and it will be necessary to dust regularly at weekly intervals for at least three dustings in order to get rid of the successive crops of lice.

Liquid lice killer may be used on the roosts and dropping boards, or the fowl may be placed in a box, the floor of which has been painted with the liquid, and a box lightly covered with burlap to confine the bird and partially prevent the escape of the fumes of the lice killer, at the same time allowing sufficient air for the fowl to breathe. As the nits or eggs of lice hatch in about a week after they are laid, and as lice mature in from one to two weeks, one treatment with the lice killer will not be sufficient to get rid of them, since the young lice will be newly hatched every few days, and several treatments given at weekly intervals will be found necessary.

III. MITES.

There are several varieties of tiny blood sucking mites to be found in carelessly kept poultry houses. These vermin are not lice, and they live and breed in the cracks and crevices about the poultry houses, particularly at the joints of the roosts or under accumulated droppings. They will breed in any part of the poultry house where they can hide by day and sally out at night and attack the fowls on the roosts. They are able to live for a long time without feeding on the blood of fowls, and are frequently found in poultry houses that have been deserted for a number of years. They are white or grayish in colour, except when filled with blood, when they vary from red to black. They will attack sitting hens, frequently worry hens so much as to drive them from their nests, and kill young chicks. When mites are discovered, vigorous means should be adopted to get rid of them.

Treatment.—The fowls should be treated with a liquid lice killer, and removed to other quarters. The poultry house should be subjected to a thorough cleaning and the free use of some good disinfectant or lice killing fluid. In some cases it will be be found necessary to fumigate the house thoroughly with burning sulphur. Liquid lice killers should be freely used on the dropping boards and roosting poles. Even if you are positive there are no mites in your poultry house, it is a wise plan to inspect the roosts and dropping boards carefully at regular intervals to make sure that they have not invaded the premises, as they are frequently brought into the poultry house by wild birds like sparrows, or may be brought in in litter material or by rats or mice. There are several varieties of these blood-sucking mites of various sizes.

1. The Scaly Leg Mite.—A very troublesome enemy to poultry is the scaly leg mite which produces the unsightly disease known as a scaly leg. To get rid of these pests, keep the poultry houses clean and wholesome, and use liquid lice killers frequently about the roosts and dropping boards.

Treatment.—To cure scaly leg, one of the best means is to make a saturated solution of naphthalene flakes in kerosene (coal oil), and dip the fowl's legs in the solution several times, at intervals of two or three days, until the crusts are all easily moved. Three or four dippings will usually cure a severe case. Another good remedy is to use an ointment made by mixing a teaspoonsful of coal oil with a cupful of lard, applying it freely. There are a number of insects which affect poultry not as common as the foregoing. but the remedies advised will be found effective in treating all of them.

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IV. INTESTINAL WORMS.

The intestines of domestic fowls commonly become invaded with worms. These belong to three classes: round worms, tape worms and flukes.

1. Round Worms have a cylindrical body, tapering at either end, like an earth worm, and vary in length from one-fourth of an inch to 5 inches. Of these seven species have been recorded from the domestic fowl.

2. Tape worms are flat, ribbon-like, elongated and slender, varying according to the species, from one-twelfth of an inch to 4 or 5 inches in length. They are composed of numerous segments. Nine species have been found in fowl.

3. Flukes differ form others in being less elongated or thread-like, but have a round or oval form, and are more or less flattened laterally. They are provided with one or more suckers by which they adhere. They are quite small, varying in the different species from one-twelfth to one-half inch in length. Five species have been found in the domestic fowl.

Symptoms.—The symptoms of intestinal worms are not marked. The birds are dull, lose strength, become thin, show no disposition to run, and are stiff in their walk. The plumage becomes rough, diarrhœa may be present and epileptic fits may intervene.

With the presence of tape worms, the same general symptoms may exist. The bird holds the head under the wing; there may be epileptic form of attacks, a stiffness of walk, or a straddling position of the legs. Sections of tape-worm may often be found by examining the excrement, but the best way to prove the presence is to kill a fowl and carefully examine the intestinal tract. This establishes the diagnosis for

Treatment.—The control of the trouble is best effected by sanitary measures. Since the excrement is the carrier of the worms, it is evident that where the trouble is prevalent it will be best to remove the fowl to fresh grounds. The excrement should be removed daily from the houses, and the destruction of the worms and their eggs in the latter effected by mixing each lot of manure with an equal quantity of quick lime.

As medicinal treatment several valuable remedies have been suggested. Oil of turpentine is one of the remedies for all intestinal worms, two teaspoonfuls administered once daily.

For tape worms a teaspoonful of powdered pomegranate root bark mixed with the food intended for 50 birds. This should be followed with a dose of castor oil, two to three teaspoonfuls to a like number.

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OF THE COLLEGE OF AGRICULTURE

DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

BRANCH OF THE LIVE STOCK COMMISSIONER

Compliments of
J. B. Spencer
Live Stock Branch,
Department of Agriculture.

THE PRODUCTION OF BACON FOR THE BRITISH MARKET.

BULLETIN No. 10

PUBLISHED BY DIRECTION OF THE HON. SYDNEY A. FISHER, MINISTER OF AGRICULTURE, OTTAWA, ONT.

December, 1905.

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December, 1905.

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Ottawa, December 12 1905.

To the Honourable
The Minister of Agriculture,

Sir:—

I beg to transmit herewith a bulletin on "The Production of Bacon for the British Market" and recommend that it be printed for distribution.

I have the honor to be,

Sir,

Your obedient servant,

F. W. HODSON,

Live Stock Commissioner

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I—INTRODUCTION.

In securing data for this bulletin, the writer has drawn not only from personal experience and observation, but from every other reliable source of information within reach. Especial acknowledgement is due to Prof. G. E. Day, of the Ontario Agricultural College, Guelph, Ont., who has been freely consulted, also to representatives of leading Canadian packing companies. The work of the experiment stations of leading pork producing countries, has been a far as possible carefully gone over, and such matter selected as was likely to be of value to Canadian farmers. In this part of the work, the writer is much indebted to the very complete summary of the work of the experiment stations given in Prof. Henry's "Feeds and Feeding."

The great expansion of dairying in Canada during recent years, has, as a natural sequence, brought about a corresponding increase in the swine rearing industry. It soon became evident that the Canadian farmer could not compete with the Americans in the production of the thick fat hog; which is a by-product, not of the cheese factories and dairy farms, but of the great corn fields of the middle, western, and southern states. In these portions of the United States great numbers of pigs are reared on the blue grass and clover. They receive a little additional feed, which is usually corn, until they are of suitable age, when they follow the fattening cattle in the corn fields, in the proportion of four pigs to one bullock; these pigs pick up the ears that the cattle break down, and otherwise consume the waste. It is said by some feeders that the cost of production by this method does not exceed three cents per pound, but in this way only the thick, fat type of pig is produced, not the finer classes of bacon. It follows then that, while Canadians cannot compete in the production of the thick, fat pig, the American feeders are not likely to produce the finer classes of bacon; even if they could, it is doubtful whether they would be willing to change their entire system of breeding and feeding to the extent that would be necessary to produce the Wiltshire sides and other of the finer grades. It became necessary, therefore, for Canadian packers to seek for a market, in which they would not be brought into direct competition with the cheap, though inferior, product of the American corn fields. This they found in the English demand for prime, lean bacon in the form of the Wiltshire side. (See Fig. 1). London is the centre of this market, which, although willing to pay liberal prices for suitable goods is somewhat limited in its demand and exceedingly fastidious. This is a discriminating market for a fancy product, and the competition, which is practically limited to Canada, Denmark, and Ireland is not so much a matter of facilities for cheap production as of skill in the production of a high class article.

The class of hogs bred in Canada a decade ago was quite unsuited to the requirements of this trade, and the packers began to ask for a hog of a quite different conformation. Some enterprising breeders and some of our packers took steps to meet this demand by importing animals of the type that the British bacon curers pronounced the ideal one for their purpose. At first, the advent of breeds of the new type was not heartily welcomed. It is true that there was a pretty steady demand for them, but it was, in the beginning, the demand that always arises for something new, rather than the recognition of the value of these pigs to the country. Then again, there was the determined opposition of breeders of long established breeds to overcome, who could see no merit or usefulness in the new type of hog. Time, however, wrought wonderful changes, and now these same breeders are devoting their skill and energy with considerable success to the modification of their breeds to meet the requirements of the packer.

We are frequently asked "Why is it that the thick, fat hogs bring better prices on the Chicago and other American markets than the lean singer"? It is to a large extent the fresh pork trade in Chicago, Detroit, Cincinnati, Louisville, Buffalo, New York, and other large cities that maintains the price of pork. They have in the United States a very large foreign population, as well as a large negro population; these people prefer the thick, fat pork, and consume large quantities of it, and of lard. In Canada, on the other hand, our home trade is small. There is, it is true, a rapidly increasing consumption of hams and bacon in our towns and cities but the demand is for mild-cured, lean, nicely marbled meat; just the class of goods required by our ex-

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port trade. There is, in some country districts, and with an occasional customer in the city and town, still a demand for stout bacon, but over 90 per cent. of the trade calls for meat that has been described as "streaked," meaning that the fat is freely intermixed with lean. The mining and lumber camps will buy and use large quantities of fat meat, but even here there is a growing demand for lighter and leaner goods, both as long clears and as barrelled pork. Recently a Canadian packing house had a large stock of long clears, running from 35 lbs. to 50 lbs. average. A great deal of this went to the lumber camps and gave satisfaction. A provision dealer in Toronto told the writer that on account of this light bacon having gone to the lumbermen, they now wanted nothing else in many cases, as it suited their requirements exactly. The big, heavy fat sides, that formerly found a ready market in the lumber camps, are now in many cases not wanted. Dealers say that it is difficult to sell these heavy sides, and that they must be sold at a low price in order to get rid of them. The lumber camps use a great deal of mess pork, which as a rule they buy in the United States, as it can generally be bought there at a lower price than Canadian packers can afford to put it up for, and this pork has the additional advantage that it can be carried for many months much better than long clears; so we suppose there will always be more or less of that cut wanted. Lumber shanties, the French population in Quebec, and the fishermen still call for a considerable quantity of fat meats. This trade, however, is growing smaller each succeeding year.

The Province of British Columbia is an important market for hog products, calling altogether for the product of sizeable hogs with plenty of lean in it. A large part of the requirements of that province is supplied by the United States, this is because the price in Canada is often too high. Curers in the Western States, are able to name prices that put the Eastern Canadian curers out of the market. This accounts for the important figures in the trade and navigation returns of imports of hog products into British Columbia.

The trade in Montreal, which uses a considerable quantity of fresh pork, as well as the large sausage and lard trade in that city, results in a quite important market there for heavy fat stock.

Though the greatest care may be taken by both our feeders and breeders to produce just what the markets require in the way of lean singers, there will always be more than enough of the heavy, fat type to meet the demand.

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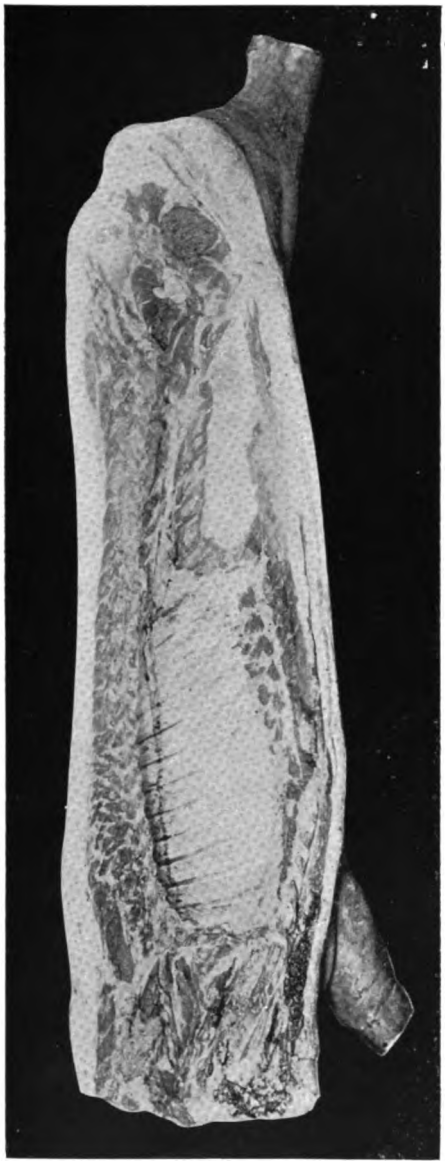

FIG. I.—A No. I Wiltshire Side: Notice uniformity of depth, also evenness and thickness of layer of fat (1¼ to 1½ inches) along back from loin to neck.

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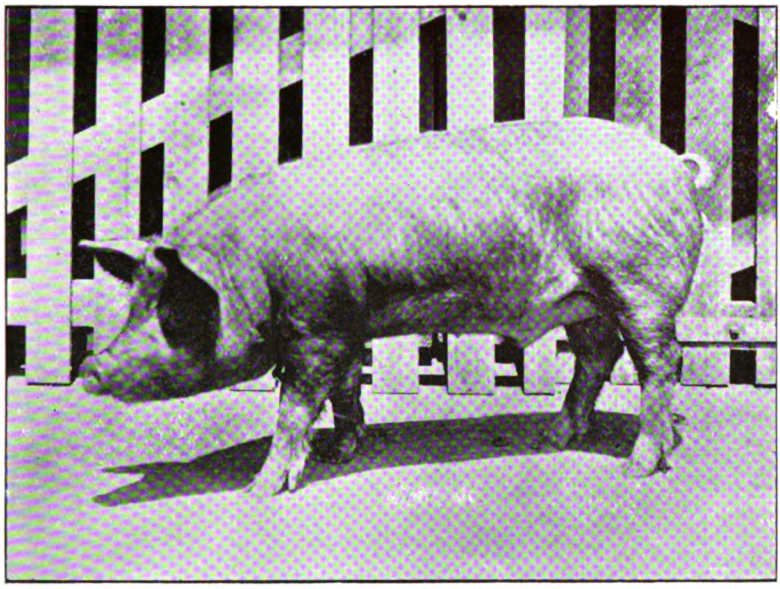

FIG. 2.—The Packers Model showing smooth even side and long slightly, evenly arched back. The head and near fore-leg are magnified by their undue nearness to the camera.

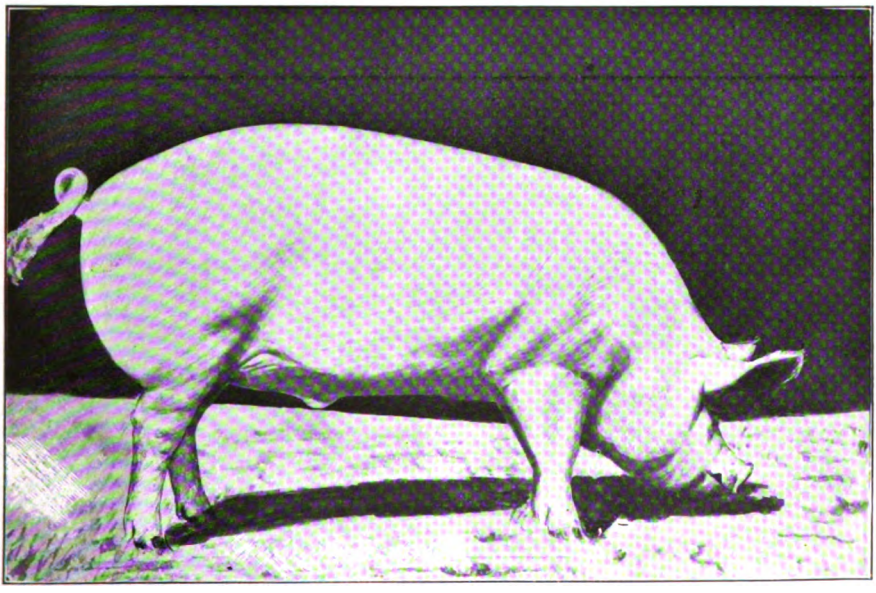

FIG. 2A.—An ideal hog for the production of Wiltshire Sides.

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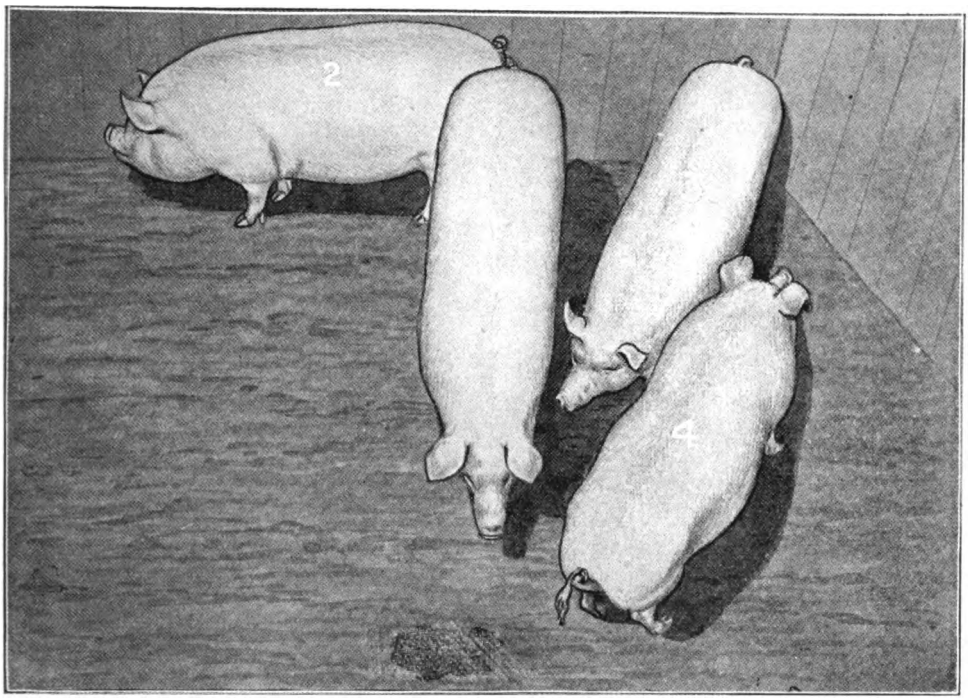

FIG. 3.—No. I good; No. 2 thick and fat; No. 3 somewhat better but too stout; No. 4 bad.

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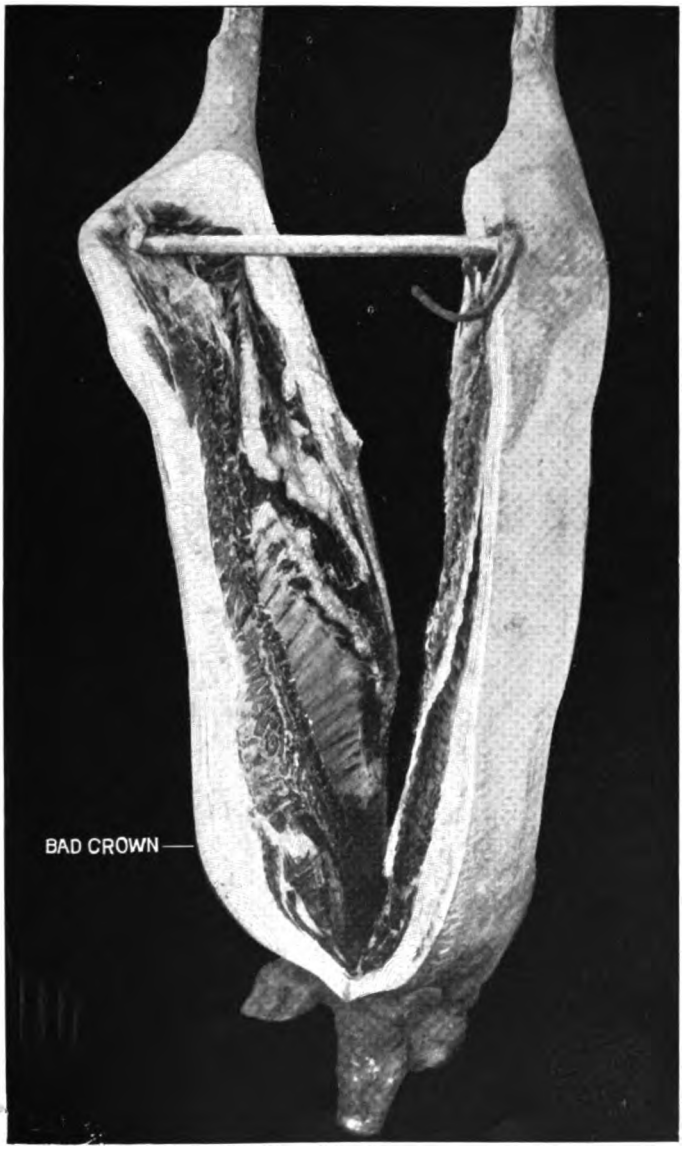

FIG. 4.—A short thick carcass showing too much fat in proportion to lean; fat too thick and uneven down back; undesirable for bacon trade.

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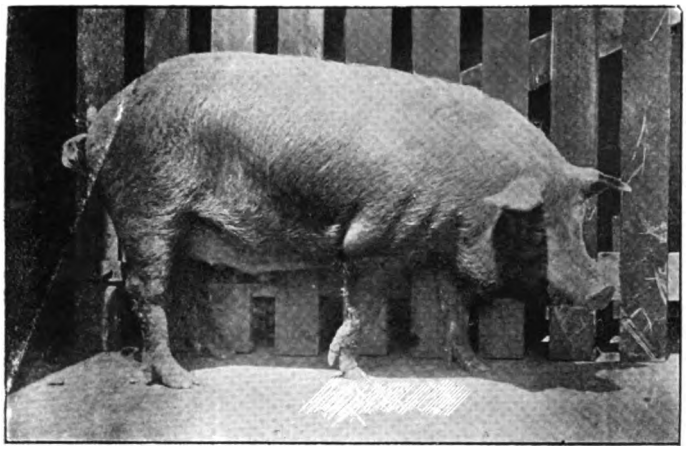

FIG. 5.—This animal shows short side due to oblique shoulder. Fig. 4 shows carcass of this pig.

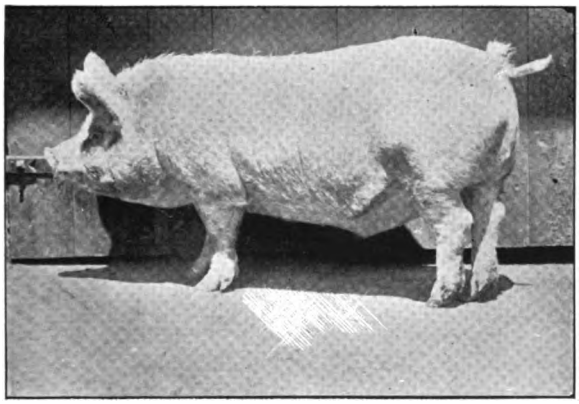

FIG. 6.—A pig forced from birth unsuited to the British trade.

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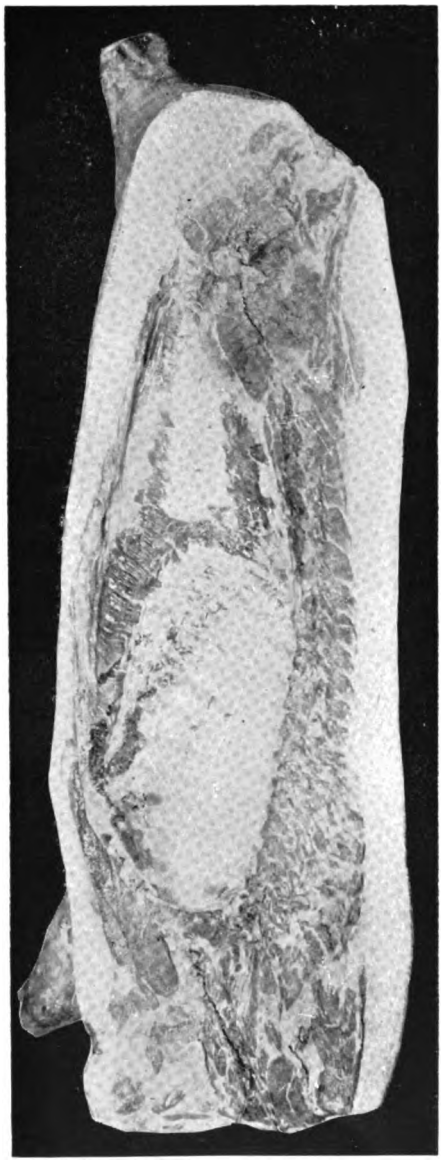

FIG. 7.—Side of pig shown in Fig. 6. Too thick and fat.

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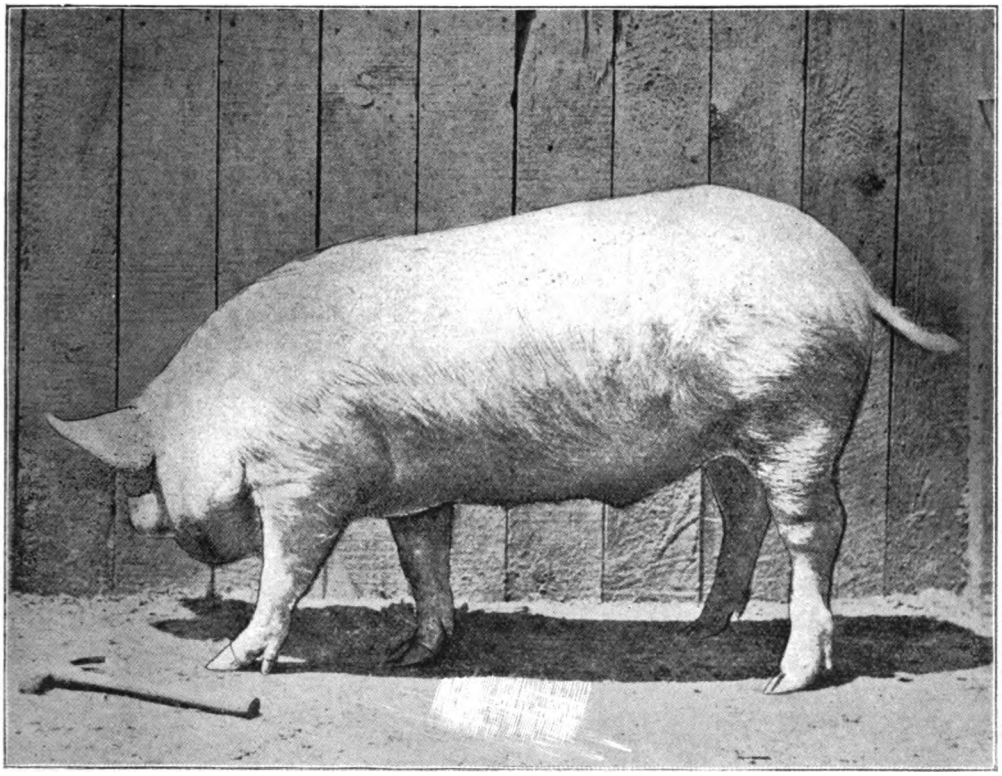

FIG. 8.—A lean singer.

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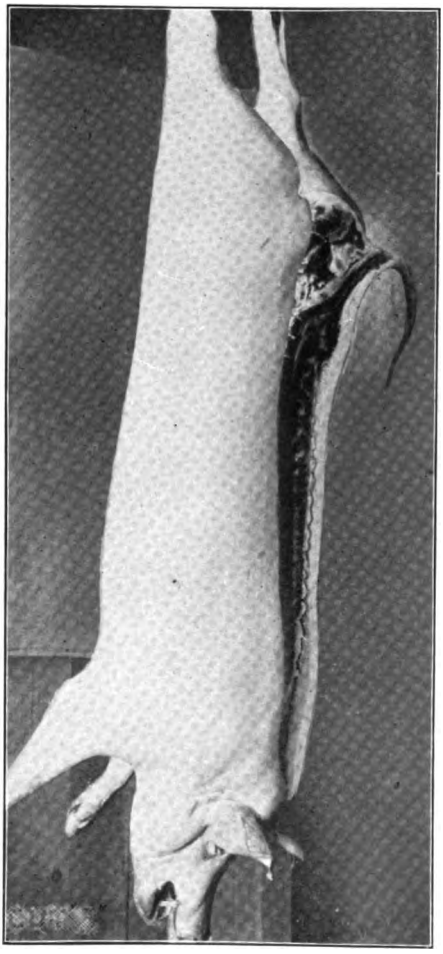

FIG. 9.—Carcass of first-class lean singer.

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II—THE STANDARD BACON TYPE.

Live stock must be judged from a two-fold standpoint:—

(1). Its adaptability to the requirements of the market.

(2). Its adaptability to the requirements of the producer, in constitution, nervous temperament, and feeding qualities.

Happily, in our bacon industry, the interests of the producer and consumer do not in any way conflict. It was for a time contended by many farmers that it costs more to produce the bacon hog than the animal of the thick fat type. The results obtained at our experiment stations supported by the experience of our most extensive and successful feeders have all gone to show that, if anything, the contrary is true. In an experiment by Prof. Day, at the Ontario Agricultural College, out of six groups of pigs, the groups scored first and third by the packer on the basis of their adaptability for the export trade, were first and second in economy of gain.

It cannot be denied that more skillful breeding and feeding is required to produce the bacon hog, but it does not necessarily require more food to produce a pound of gain than is required by hogs of other types.

The hog required for the production of the Wiltshire side is illustrated in Figs. 2 and 2a, and No. 1 in Fig. 3. In weight he should be not less than 170 lbs. nor more than 220 lbs., the most desirable weights being from 180 to 195 lbs, alive when fasted.

As will be seen, he is a smooth, trim, evenly developed pig, of great length, fair depth, and moderate thickness. Described in detail, he should conform closely to the following:—

HEAD.

Snout should be for the breed moderately fine, and of medium length. A very short stubby nose is usually associated with a short, thick body; on the other hand, a very long, narrow snout, and head, like a long face on a steer, generally indicates poor feeding qualities.

Ears should be fine in texture, firmly attached, and alertly carried. A coarse and loosely carried ear indicates a sluggish temperament, delicate constitution, and poor feeding qualities.

Eyes:—The eye is an excellent index of the health and also of the nervous temperament. Any departure from the normal in health and vigour will be indicated as quickly and surely by the eye as by any other organ. A small, sunken, dull eye is an almost unfailing indication of a sluggish circulation and low vitality; a wild flashing eye indicates a nervous disposition that is highly undesirable; eyes of good size and prominent, bright but placid, indicate health, docility, and good feeding qualities.

Jowl, light, trim, and neat. A large, flabby jowl is objectionable, not only because it is of little value, but it is usually associated with excessive fat and flabbiness throughout. (See Fig. 3. No. 2, and note the short snout and heavy jowl).

Neck, of medium length, and showing no tendency to arch on top. A pig with an arching neck will cut too thick over the top of the shoulders. (See Fig. 4).

FORE-QUARTERS.

Shoulders, light and smooth. They should be very compact on top, and no wider than the rest of the back. (See Fig. 3 and compare No. 4 with No. 1). It is important that the shoulder blades be upright; it is not enough that a pig be long from tip to tip, he must be long from shoulder blade to ham. Some apparently lengthy pigs will cut a short side of bacon, because of faulty conformation of the shoulder, the shoulder blades being too oblique and running back too far into the side. (Fig. 2 represents a good shoulder).

Breast, of good width and full, indicating a large chest with plenty of room for vital organs. Sometimes the apparent width of the breast is increased by faulty attachment of the fore-legs, they being tacked on, so to speak, on the outside of the body. This conformation is always accompanied with a rough shoulder.

Fore-legs, set well apart without going to the extreme already spoken of, medium length, and straight; pasterns strong, upright and moderately fine. The legs should be of fair length. Nature insists on preserving a certain measure of symmetry or co-relation of parts, and a short legged animal is usually a short bodied animal. It is hard to get them long and low; and since our aim is to breed for long sides, we must be willing to allow a corresponding length of leg. Excessively fine bone is usually associated with a tendency to fatten at the expense of growth,

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and this, of course, is fatal to the production of the Wiltshire side; on the other hand, very coarse bone is indicative of general grossness throughout and is therefore undesirable.

BODY.

Back, of medium width, rising slightly above the straight line, and forming a slight arch from neck to tail. Fig. 2 is correct in this particular, while Fig. 6 is defective. A sagging back indicates a lack of muscle or lean meat throughout. This is well illustrated in Fig. 7 which shows a side of the pig shown in Fig. 6. Note the excessive fat and lack of lean flesh or muscle down the back.

Sometimes a pig will show a drop in the back just behind the shoulder. This often indicates a weak constitution. The back should be nicely rounded from side to side and of medium width. This is very well illustrated by Fig. 2 and by No. 1 in Fig. 3. A broad, flat back is usually associated with a short, thick, chunky conformation throughout. On the other hand the ribs should not fall away too abruptly from the back bone, giving the formation known as a "herring back." A back of this description will, on cutting, be found to be bare and lacking in muscle or lean flesh. (See Fig. 3. Nos. 2 and 4), to illustrate broad back and chunky conformation.

Loin, should be strong and full but not unduly arched. It should be of the same width as the rest of the back and well covered with flesh.

Side:—Since the side is the most valuable part of a bacon hog, it should be long, smooth, and filled out even with the shoulder and ham; it should be deep enough to provide for constitution. but not so deep as to give an excess of thin, flabby belly-meat. See Fig. 2 and note length of side from shoulder to point of ham; note also the trim, firm belly and entire absence of flabbiness; Fig. 1 shows a Wiltshire side made from this pig, sides of this type command the highest price on the English market; contrast Figs. 1 and 2 with Figs. 6 and 7. The former are worth 50 cents per cwt. live weight more on the Canadian market than the latter. The first sells readily on the English market, while the other is almost unsaleable.

Heart-girth, should be full, indicating constitution; the fore flank should be well let down and full behind the elbow. Fig. 2 is somewhat deficient in this particular, showing a slightly tucked up appearance behind the fore-legs. The packer would not object to this defect, but it is a fault that the breeder and feeder cannot afford to overlook. This is an opportune time to sound a note of warning to Canadian breeders. There is a noticeable tendency toward over-fineness with lack of vigour to be seen in many of our breeding herds. Judges at exhibitions are in part to blame for this. In too many cases undue stress is laid on smoothness of shoulder, length of side, shapeliness of ham, etc., while those features of the conformation that indicate constitution are apparently ignored. This is quite right in bacon classes; these should be judged wholly on their adaptability to the requirements of the consumer, but in judging breeding classes the interests of the producer must not be overlooked, or even be placed second to those of the consumer. Fortunately the two can be easily harmonized; the depth and fullness of the chest and fore-flank, necessary to give room for the vital organs, does not imply roughness of shoulder, shortness of side, or paunchiness of belly, or in any other way detract from the value of the carcass

Hind-flank, well let down and full, giving a straight underline, which should be markedly trim and neat, showing no flabbiness. Fig. 2 shows the desired conformation very nicely. Fig. 6 shows a paunchy, thin belly.

HIND-QUARTERS.

Rump, should be the same width as the back, of good length and drooping gradually from the loin to the tail, and nicely rounded over the top from side to side. Fig. 2 illustrates the desired conformation. Fig. 8 shows a faulty rump; too short and too drooping from loin to tail-head.

Ham, very trim and neat, tapering gradually to the hock, heavily muscled and firm. Any tendency to flabbiness or folds is very undesirable. Fig. 2 shows a good ham. Fig. 8 shows a fair ham not so heavily muscled as could be desired. Fig. 9 shows an ideal ham hung up, note that it is medium in size and tapers evenly down to the hock.

Hind legs, firmly and squarely set with hocks tolerably well apart, but not bowed outward; the bone should be flat, clean and moderately fine, and the pasterns upright and strong. They should be of medium length as already mentioned in describing the forelegs: a very short leg

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usually indicates a short, compact conformation throughout, while excessive length of leg is often associated with poor feeding qualities.

Quality is a general term somewhat hard to define, but readily recognized by the experienced stockman. To say that a pig has lots of quality is to imply that his general appearance denotes good breeding; that he has a clean cut, trim, tidy, attractive appearance, with no sign of coarseness as indicated in the bone, skin, and hair; that he is symmetrical, no part abnormally developed; and that he is active in his movements but neither wild, cross, nor restless.

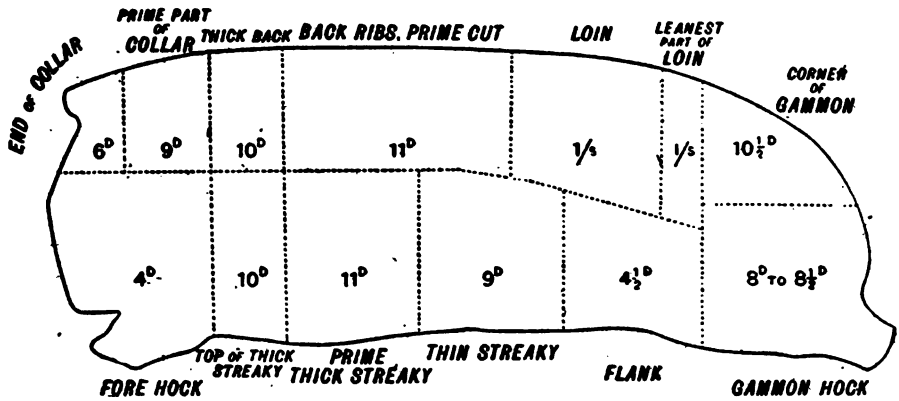

FIG. 10.—TAKEN FROM A REPORT OF THE ROYAL AGRICULTURAL SOCIETY OF ENGLAND, SHOWS THE RELATIVE VALUES ON THE ENGLISH MARKETS OF THE DIFFERENT CUTS FROM A SIDE OF BACON. THIS CUT EXPLAINS THE EMPHASIS LAID ON LENGTH OF SIDE, AND STRENGTH OF BACK, ESPECIALLY OF LOIN, IN THE FOREGOING DISCUSSION OF THE VARIOUS POINTS OF CONFORMATION, BUT DOES NOT REPRESENT A MODEL SIDE.

SCORE CARDS.

"It is, perhaps," says Prof. Day, "too much to expect that there will ever be entire unanimity of opinion among judges, yet it is something greatly to be desired, and all effort should be made to come as near to this desired end as possible. The main difficulty in judging seems to arise from the fact that judges differ regarding the relative importance of the various parts of an animal. They may be in entire accord as to what constitutes a perfect bacon hog but unfortunately, perfect animals are scarce, and it is in the attempt to balance one defect against another that differences in judgment frequently occur. It would seem reasonable therefore to assume that some authoritative standard of excellence and scale of points would be helpful in bringing about hereafter uniformity in judging.

"There exists in the minds of some people a very strong prejudice against a scale of points, yet no judge, worthy of the name, ever makes awards in a show ring without a standard of excellence and scale of points in his mind. That is, he has his own ideas as to what constitutes perfection in the various parts of an animal, and he has also his own ideas as to the relative importance of these various parts. Without these things he cannot judge, for he has no basis on which to make awards. Yet the actual use of a score card in a show ring is to be condemned.

"Scoring animals is a useful practice for the student, training him to notice all points of the animal, forcing him to make up his mind whether defects are serious or otherwise, and guiding him as to the relative importance of parts, but all this should be learned before he attempts to act as judge.

"The scale of points, then, is merely a means towards an end. It is an aid to judgment. It can serve merely as a general guide to judges, and, properly used, will aid in securing uniformity.

"The preparation of a scale of points is no easy matter, and the scale presented here is not claimed to be perfection. It represents an effort to bring the question before the people in a tangible form, in the hope that something authoritative may result. In the scale of points given herewith, an attempt has been made to distinguish between a breeding animal and one

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intended for slaughter. It is quite apparent that in breeding animals, weight limits should not be used. On the other hand, an animal that is to be slaughtered need not be criticised as to eyes, ears, hair, style, or the strength of its pasterns, while weight becomes very important."

SCALE OF POINTS FOR HOGS OF BACON TYPE.

Prepared by Prof. G. E. DAY.

Head and Neck—8 points.	
Snout, moderately fine	1
Eyes, good size, full and bright	1
Jowl, light and neat	3
Neck, medium length and rather light, with no tendency to arch on top	3
Fore-quarters—17 points.	
Shoulders, light and smooth, rounded from side to side over top and very compact, no wider than back	9
Breast, good width and full	4
Fore-legs, set well apart, medium length, and straight, pasterns upright, bone flat, clean and moderately fine	4
Body—40 points.	
Back, medium width, rising slightly above the straight line, and forming a very slight arch from neck to tail	9
Loin, strong and full but not unduly arched, wide as rest of back	5
Ribs, good length and moderately arched	3
Side, fairly deep, long, smooth and straight between shoulder and ham, a straight edge laid over shoulder point and ham should touch the side throughout	12
Heart-girth, full, but not flabby at fore flanks, filled out even with side of shoulder, there should be no tucked up appearance back of fore legs, nor droop back of shoulder top	5
Flank, full and low	1
Underline, straight; the belly should be markedly trim and neat	5
Hind Quarters—15 points.	
Rump, same width as back, long and slightly rounded from a point above hips to tail, and rounded from side to side over top	5
Ham, full without flabbiness; thigh tapering towards hock carrying flesh well down towards hock	6
Hind legs, medium length, hocks set well apart but not bowed outward; bone flat, clean and moderately fine; pasterns strong	4
Quality—15 points.	
Ear, rather thin, firm and of medium size (1); hair fine and abundant (2); skin, smooth showing no tendency to wrinkle (3); bone, flat and clean in legs, moderately fine in snout and head, and showing no prominence on side and top of shoulder (4); flesh, firm and smooth, with no flabbiness at jowl, fore flank belly or ham (5)	15
Style—5 points.	
Active in movement, walking without a swaying motion and standing well up on pasterns	5
Perfection	100

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III—UNDESIRABLE HOGS FOR BACON PRODUCTION.

There are a number of classes of undesirable hogs being marketed for bacon at all seasons of the year. These include unfinished, overfat, prematurely finished hogs, and sows that have been used for breeding purposes. Of these the unfinished animals are most objectionable, and during the season of 1905 have been marketed in numbers out of all proportion to what they should be.

UNFINISHED HOGS.

According to reports from a number or the large packing companies the proportion of unfinished hogs is increasing, running at times as high as thirty per cent. of the total receipts at packing houses in Central Ontario, twenty per cent. in the Ottawa district, and about fifteen per cent. in Western Ontario. This is a very serious matter from the standpoint of all concerned as such pigs dress poorly, giving a low percentage of carcass, and they make such inferior meat that the reputation of Canadian bacon stands in danger of serious injury if the present proportion of these pigs continues to go forward as bacon.

Why hog raisers persist in sending this unfinished stuff to market is not easy to understand, unless it is the comparatively high price of coarse grains which are necessary in finishing these animals, and perhaps in some cases a fear that the high values for hogs which have prevailed for some time would suddenly drop. These, however, are not valid reasons when the injury such animals do the trade is considered. The "grass" or unfinished hog is a serious menace to the bacon industry and the time has come when the farmers, the buyers and the packers ought to co-operate against him.

One of the leading Canadian pork packers and exporters speaking of the objections to the unfinished hog says:—"He won't make good bacon; he is an unprofitable hog to ship alive, an unprofitable hog to slaughter and when he is made into bacon it is thin and tough and has to be sold at a heavy reduction on select goods." Another packer says:—"The thin unfinished hog is not a bacon producer at all and should be kept back and fed up until it weighs not less than 180 lbs. When thin sides are converted into bacon they invariably cause trouble as well as direct monetary loss." Still another packer expresses his views upon the light hog. He says: "The chief objection to unfinished hogs for bacon is that they shrink in killing about 5 to 8 per cent. more than when they are finished, which, consequently makes the bacon so much dearer; and in the Old Country they do not want sides weighing less than 50 lbs. which means that the hog must be at least 160 lbs. and in good flesh in order to produce 50 lb. sides; anything below 160 lbs. makes bacon which is undesirable and hard to sell."

In England the buyers refer to the bacon from thin hogs as "skin and misery." Some of them have become very emphatic in their denunciation of it, stating that the bacon trade has already received serious injury from it, and the sooner it is stopped from being sent over the better it will be for the trade; if it continues to be sent as it has been for the past few months the trade will soon cease to exist. A hog that is too thin to make bacon of a desirable weight and quality is similar to any other inferior product inasmuch as it lowers the value of the better goods and seriously injures the trade to which it belongs.

Fig. 11 fairly well represents the class of hogs known as unfinished; the sow is of good type for bacon production but she is in only field condition. Fig. 12 shows a side of this thin pig.

OVER-FAT HOGS.

Notwithstanding the fact that the over-fat hog has been preached against for years by those interested in the development of the high-class bacon trade, and the fact that the price paid for these animals is frequently cut to the extent of one-quarter of a cent to one-half cent per pound for the live hog, the supply of overdone animals continues much too great more especially during the late fall and winter season. The demand for the pork from such animals is becoming less and less, and as a rule the bacon from such hogs will have to be sold at say an average of five shillings per 112 pounds less than prime lean. Why these animals are kept so long at the trough is a mystery unless it is to catch an improved market. It seems to be an overlooked fact that the last few pounds of an overfat hog are produced at a much greater relative cost than the same number of pounds added to an animal approaching the finished condition. It is therefore clear that a feeder who holds his hogs beyond the finished stage does so at a loss even though he receives an advance in price and is not docked for over-fatness—results

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not often secured by holding. There is no doubt that these hogs rob the feeder. Feeding experiments have shown that hogs do not give good returns for food consumed after they have passed the finished condition. (See table under "Cost of Gain and Different Stages of Growth page 24)

The marketing of hogs that exceed 220 lbs. live weight should be discouraged for the production of bacon as such causes loss both to the producer and the packer.

PREMATURELY FINISHED HOGS.

Another class of undesirable hogs for the production of fine bacon is the prematurely finished pigs weighing from 145 to 160 lbs. live weight. These are doing much to injure the reputation of Canadian bacon. As a rule the animals of this class are pleasing to the eye, they kill out a high proportion of meat to the carcass and they satisfy the palate of the consumer, especially when eaten fresh, but when made into bacon they do not fill the requirements of the market. The size is objectionable to the buyers, packers tell us that this class of goods cannot be sold at a profit on the London market. For this reason it is decidedly unwise to force hogs along to the finished state that have not had time to attain a weight of at least 180 pounds.

There is a demand for bacon made from these light well finished pigs but it is so limited that there is always danger of an over supply when the price is sure to fall several shillings per cwt. and the stock becomes a drag on the market. The pig of this class is not the fault of the breed to which it belongs, nor the character of the animal, but rather to the over generosity of the feeder who has kept his charge confined in close quarters and forced it along from an early age to the finished animal of short dimensions and insufficient weight at from four to five months old. Fig. 6 shows a specimen of this class too often seen on the market, and Fig. 7 shows the thick, short, undesirable side such an animal produces.

SOWS.

Too many of the cargoes of hogs that arrive at the packing houses contain more or less of sows that have reared one or more litters of pigs. These can rarely be used as bacon producers; the great majority are not bacon animals and never should be sent to market in "bacon" condition. As a rule those that are not too heavy are too thin in flesh and therefore may be classed as unfinished; and those that are well enough fleshed are too heavy to yield sides suitable for the bacon trade. The presence of so many of these sows in shipments of bacon hogs is largely due to the too common but unwise practice of turning off brood sows while still young instead of allowing those that are promising to remain in the herd as matrons for a number of years making good mothers of large litters. While it is true that some first litters turn out to be well doing, vigourous animals, the great bulk of them are not so strong as litters from older sows. To continue to breed only from these immature sows, turning them off after the first litter, is to perpetuate weakness rather than strength in the individuals of the herd which will in time show itself in a race of swine that are not good thrivers and are prone to ailments and weaknesses that will seriously interfere with profit-making in pig rearing. To market young brood sows in medium flesh is to injure the bacon industry both directly and indirectly—directly in lowering the average quality of our bacon, and indirectly in weakening the constitution of our bacon herds.

The question will arise, what is to be done with the animals that have outlived their profitable usefulness in the breeding herd. It has been shown that it is not in the interest of the industry to turn them off as bacon animals. It is the animals of this class that may be depended upon to supply the heavy pork and lard trade and for this purpose they should be made thick fat. How to make them so at a profit is a question of importance. A thin sow placed in a pen and fed almost exclusively on grain will in all probability "eat her head off" before she is thick fat, but there are better ways of fattening such an animal. The diet of an old sow or "stag" should be composed largely of such cheap foods as mangels and sugar beets, if in season, or pasture crops such as clover, alfalfa, rape, etc., a vigorous sow or stag getting an abundance of any of these foods will gain rapidly and if given a moderate grain ration will soon be fit for the market.

The best time to place a thin sow in the "feed lot" is in the early summer after her spring litter has been weaned and she has dried off. If turned on a luxuriant pasture and given a small grain ration gradually increasing it, she will as a rule in from 8 to 12 weeks be fat enough to meet the requirements of the market. While the gains made by such an animal have cost high per cwt. it should be remembered that she has given a profit many times over as a mother and it s the last hundred or two of gain that renders her entire carcass of marketable value.

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IV—BREEDS AND BREEDING.

Since the pork packers are in closest touch with the British consumer, they are the most competent judges of the class of hogs required for the most profitable trade; and we find that they recommend the use of Yorkshires and Tamworths as especiallv suitable for the production of bacon hogs, while Berkshires of the newest type are excellent. The other breeds are not, as yet, so well adapted, but, as has been already stated, the breeders of these breeds are rapidly bringing their pigs into line, and sows of these kinds when crossed with males of the more approved bacon type, produce good bacon pigs. These cross-bred pigs frequently make more economical gains than the pure-breds. The Yorkshire-Berkshire and Tamworth-Berkshire cross is especially popular.

No breed or combination of breeds has a monopoly of all the desirable qualities in a pig. "There are good and bad in all breeds, and bad and worse in some." It does not follow that because a hog is of any given breeding he is necessarily a good or a bad bacon hog. It is necessary, therefore, that the breeder of market hogs has a clear-cut conception of the ideal pig; then he will be in a position to make the best of the materials at his disposal by judicious selection and careful breeding.

SELECTION OF THE SOW.

Care should be taken in selecting the females of the herd to choose only those of a quiet contented temperament. Few things are more exasperating than a roving, noisy, discontented sow; not only is she a continual menace to fences and gates, but she is cross at farrowing time, and is quite as likely as not to destroy half of her litter in a fit of nervous excitement. In addition to this, a sow of this description is seldom or never a good milker, and every stockman knows that the profit or loss on a batch of pigs is determined largely by the start they get in life during the first six or eight weeks. The milking qualities of the sow is a matter too often overlooked or ignored when selecting the females for a breeding herd. Many men seem to take it for granted that if they can get a sow to produce a large litter, she will, as a matter of course, nourish them afterwards. This is a grave mistake. Sows vary in their milking propensities as widely as the cows in an unselected herd. Among pigs the ability to give a large flow of milk is more a family trait than a breed characteristic; that is to say, different families of the same breed differ more in this particular, than do the different breeds. It is therefore, largely a matter of selection. A well formed udder is, of course, essential. There should be not fewer than twelve, better fourteen, well developed, evenly placed teats, extending well up to the fore-legs.

The sow should be large and roomy, with great length and depth of side, she must, however, be trim and neat in her outlines, showing no tendency to bagginess or flabbiness, and, though not wild or nervous, she must be active in her movements. An animal having a heavy, listless, clumsy walk should not be retained in a breeding herd. This indicates a lack of vital force; and an animal with this characteristic is not likely to be so prepotent as one with a more active, sprightly temperament.

The brood sow should be selected from prolific families. A sow must raise a given number of pigs each year to pay expenses, and each additional pig represents a profit. There is, however, a limit to the number of pigs in a profitable litter; very large litters are apt to be weak and uneven in quality. Few sows can properly nourish more than fourteen pigs and an even litter of from eight to twelve large, strong, lusty fellows is much more profitable than a litter of sixteen or eighteen weak, flabby, and ill-nourished pigs.

SELECTION OF THE SIRE.

The choice of the sire is perhaps the most important step in all breeding operations. The trite remark that "the sire is half the herd" is only part of the truth. He is much more than half of the herd because, of the two parents, he usually exerts the greater influence on the conformation of the offspring. This, of course, is true only when he is the more intensely bred. It is not enough that he be pure-bred, it is important that he come of a line of ancestry, on both the male and the female side, that are remarkable for uniformity, and individual merit. If he be the chance result of a line of indiscriminate breeding, he is not likely to prove an impressive sire. His stock can scarcely fail to be irregular in type. This point cannot well be overem-

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phasized, for it is just here that the novice in breeding is most apt to make mistakes. It is a too common practice to select and buy breeding stock from among the winners at our exhibitions, taking care only to stipulate that they be eligible for registration. Frequently a phenomenal show yard animal is an accident of birth, and, even though he be registered in the herd book, is none the less a "scrub" in point of breeding, and can reproduce his good qualities only by accident. It is unfortunately true that a certificate of registration is not always a certificate of merit. The only safe way to select breeding stock, is to visit the long established herd of some breeder of repute, and buy after seeing the sire and dam, and, if possible, the grand-sire and grand-dam of the animal selected. Choose a hog from a large, even litter; fecundity is an hereditary trait and is essential to profitable hog raising; and the evenness of the litter is a valuable guaranty of the excellence of his breeding, and of his consequent prepotency.

The offspring of immature parents should seldom or never be used for breeding purposes. They are apt to lack in constitution and vigour; this is especially the case in the offspring of an immature dam. Few things will more quickly and surely deteriorate a herd in size, vigour, and fecundity, than the continued use of immature females.

In conformation, the boar not only must be of the approved bacon type, but must have that distinct and unmistakable masculinity of appearance; this is easily recognized but not easily described. Masculinity does not necessarily imply undue coarseness; it consists rather in a bold, fearless, "come on, who's afraid" expression of countenance than in any peculiarity of conformation. A certain amount of coarseness is unavoidable, especially in an aged boar; but he must not have such excessive roughness as would indicate poor feeding qualities. Nor is it desirable that he be of extreme size. Mr. Sanders Spencer, the noted English breeder says on this point: "Although some persons make mere size a great point when choosing a boar, our experience leads us to consider this to be a mistake; a very large boar seldom lasts long; he becomes too heavy for the sows; he probably proves to be slow and his litters few and small in number. A very large and heavy boar is also more likely to suffer from weakness of the spine or hind quarters, and is frequently weak in his joints and crooked in his legs. These latter failings especially should be avoided, as they are hereditary, and will frequently crop up for several generations. Weakness of ankles and roundness of bone, two qualities which should be avoided in a sire, are often allied with great size. A medium sized, compact boar, heavy in the hind-quarters, and light in the fore-quarters will frequently continue fruitful for at least twice as long as will the heavy shouldered and coarse boned boar. Nearly all of the most successful pigs have been on a small rather than a large scale.

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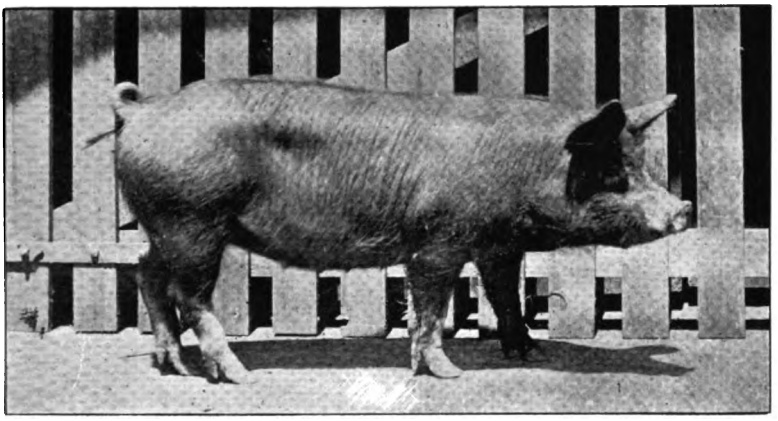

FIG. 11.—An unfinished pig of good bacon type, similar to thousands annually marketed.

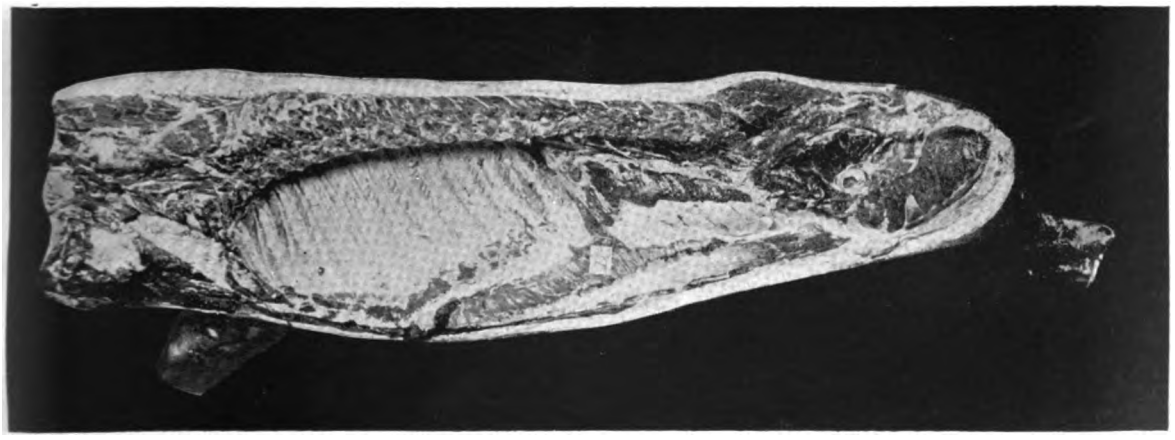

FIG. 12.—Cured side of pig shown in Fig. 11; too thin and of inferior quality.

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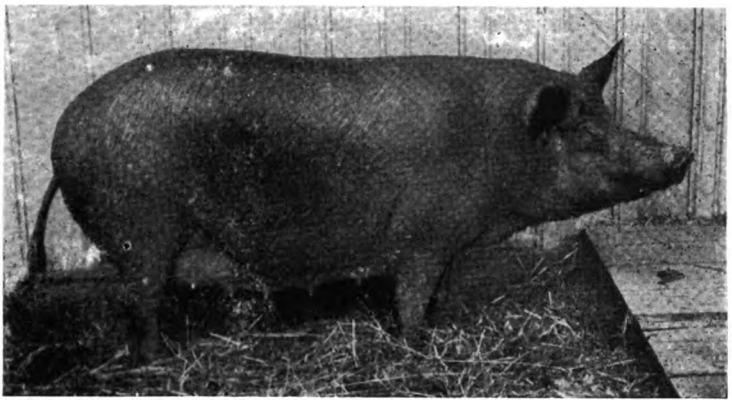

FIG. 13.—TAMWORTH SOW.

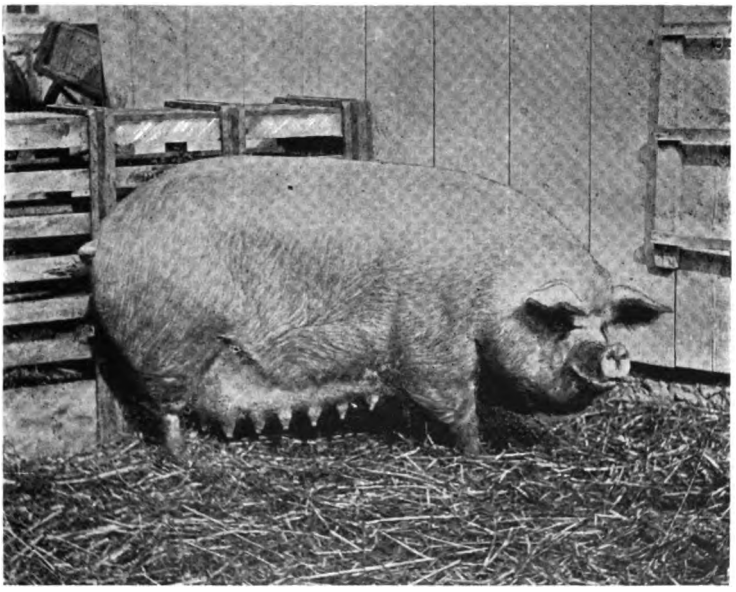

FIG. 14.—YORKSHIRE SOW.

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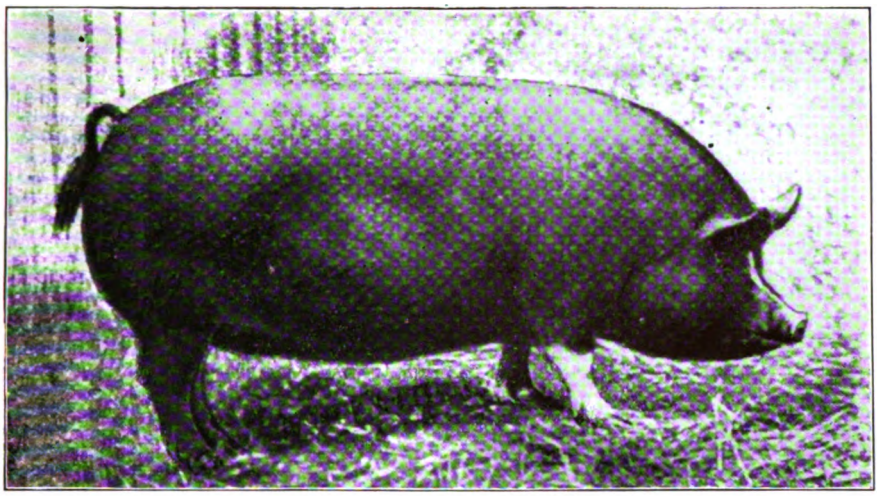

FIG. 15.—BERKSHIRE SOW.

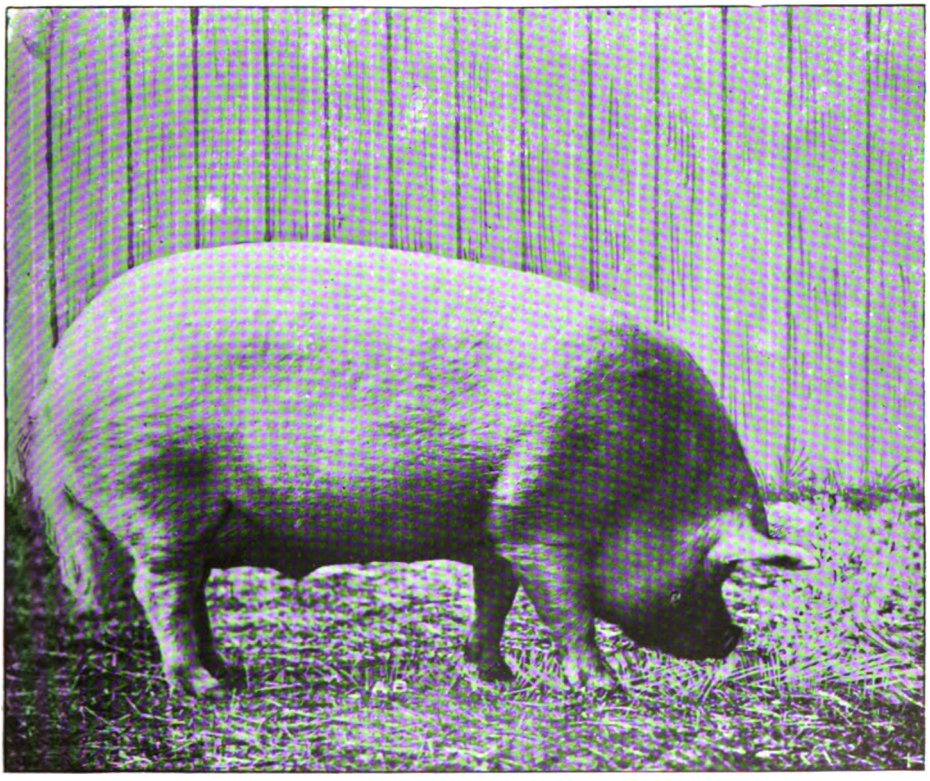

FIG. 16.—YORKSHIRE BOAR.

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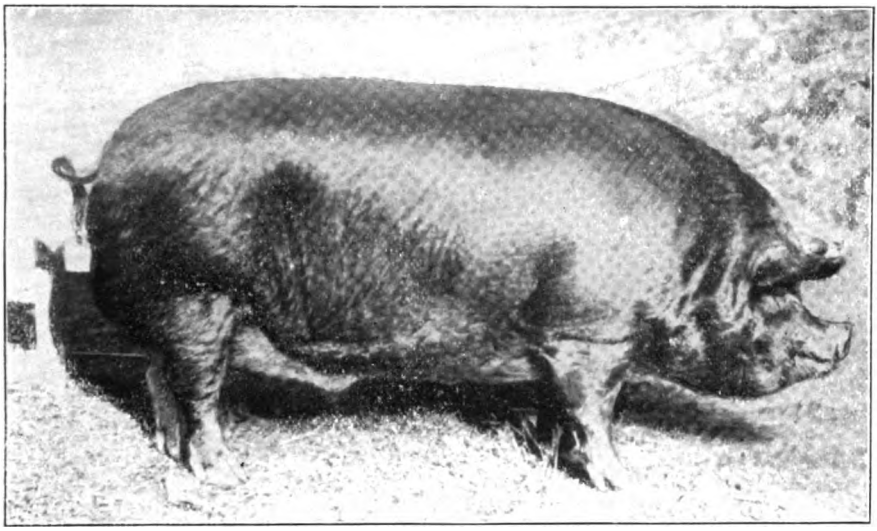

FIG. 17.—BERSHIRE BOAR.

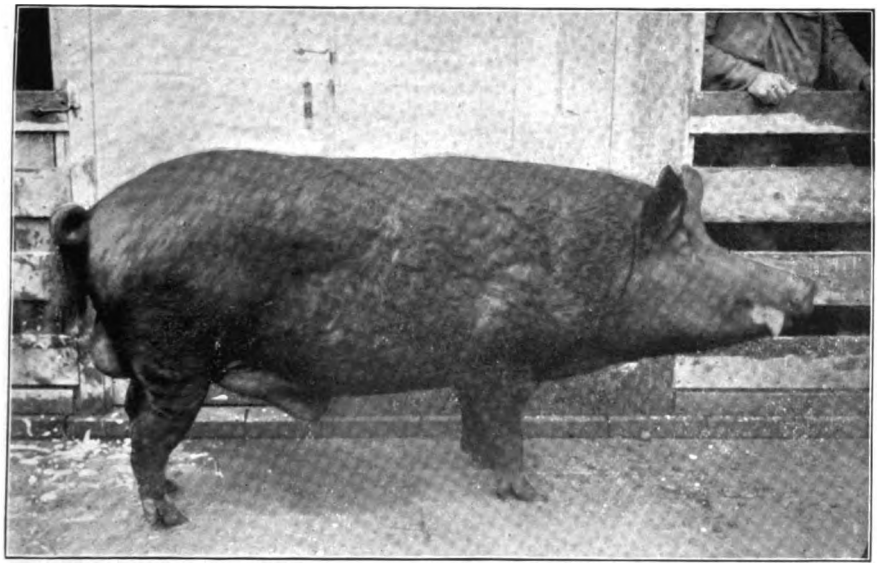

FIG. 18.—TAMWORTH BOAR.

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V—CARE OF BREEDING ANIMALS.

THE BOAR.

Assuming that the pig has been purchased shortly after weaning, he should be placed in a dry, clean, roomy pen with access at will to a paddock. It is well to give him a barrow of about his own age for company; feed liberally on food calculated to form bone and muscle but do not force him too rapidly; care must be taken to avoid getting him too fat. No better food can be given than the by-products of the dairy with middlings or ground oats supplemented with plenty of succulent food in the form of grass or roots. Let him root in the paddock; it is the best exercise he can take, calling into active play every muscle in the body, and, besides, it furnishes him with amusement and occupation. Curry and brush him frequently; it not only keeps his skin and hair healthy and active, but tends to make him quiet and gentle. The tusks should be removed as soon as well formed.

THE SOW.

Breeding sows should not be closely confined summer or winter, but should be given the run of a pasture in summer and of a large yard in winter. If there is one mistake more common than another in the management of the breeding herd, it is the failure to provide for and compel the hog to take, sufficient exercise. The hog is by nature a grazing animal, and exercise is essential to his welfare. If the sows can be given the run of a pasture during the summer and of the stubble in autumn, they will require little else to keep them in excellent breeding condition. They must, of course, have water and shelter; if they have access to a running stream in which they may wallow, so much the better. A mud bath is Nature's method of keeping a hog's skin healthy and free from vermin. Shelter is best provided by the use of a portable pen.

In winter, they should have the run of the barn yard, a dry sheltered spot being provided for them to sleep in. A portable pen serves the purpose admirably. It is better not to be too warm so long as it is dry, free from drafts, and well supplied with straw in which they may huddle. If their sleeping quarters are made too warm, they chill too quickly on going out into the yard, and they will not voluntarily take enough exercise.

They should be fed on nutritious but not too concentrated food. Mature, thrifty sows can be maintained in excellent breeding condition on a ration consisting largely of roots, preferably mangels or sugar beets. During a very cold snap, some grain should be given to assist in maintaining the animal heat. As the sows become farther advanced in the period of gestation it is necessary to give more nourishment in less bulk, therefore the allowance of mangels should be gradually decreased and the complement of grain correspondingly increased as the season advances. The grain used should be of a flesh forming, rather than of a fat or heat producing character. Shorts, or middlings, is excellent, so is ground oats; barley or corn should be used sparingly, unless diluted with some form of dairy by-product. If fed alone these grains are too "heating" in their effect on the system. Sows wintered in this way should not be given thin sloppy food; the meal fed should have just enough water or milk poured over it to moisten it well. They will get enough water in the roots fed, to supply all the requirements of the system; and to compel them to take water in excess of that amount, especially in cold weather, is to impose an unnecessary tax on the constitution. The energy required to warm up and throw off from the system a surplus of water, which some feeders compel their hogs to take in the form of thin sloppy food, is an unwarranted waste that not many can afford.

The objective point to be aimed at in the wintering of brood sows is to nourish and care for them in such a way that the spring litters will consist of good sized, well nourished, healthy, vigorous pigs, and that the sows themselves will be in such a condition of flesh as will carry them well over the trying period of nursing. To do this, the sows must have plenty of exercise, and must be fleshy but not fat. Sows carrying a load of soft, flabby fat put on in close pens will drop undersized and delicate pigs and they themselves will fail rapidly during the milking period. In addition to this, sows kept closely confined and fed largely on grain are apt to have their digestive systems so deranged as to develop abnormal appetites, and at farrowing time are as likely as not to devour a portion if not all of their offspring. On the contrary, experience has shown that the system of wintering previously recommended, in which the sows are given abundant exercise and fed on a nourishing but cooling, succulent ration, has invariably been followed with the most satisfactory results.

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A week or ten days before farrowing, the sow should be placed in the breeding pen, in order that she may become reconciled to her new surroundings before the critical time arrives. It is also important that the attendant get on good terms with the sow; a few minutes spent on her every day with a stiff brush will be a good investment of time. This "currying favour" with the sow should not, of course, be a mere spasmodic effort at each farrowing period, it is the habitual practice of the thorough-going and successful stockman.

The breeding pen should not be too large; about 8 feet square. If the pen is too large, there is danger in cold weather of the newly farrowed pigs wandering away from the dam, getting lost, and perishing from the cold. The pen should be warm and dry, and furnished with a fender to prevent the dam overlying her young. This consists of a plank or pole placed all around the sides of the pen about ten inches from the wall and eight inches from the floor. Very little bedding should be used and this should be chaff or cut straw. If a large quantity of long straw is used, the youngsters are apt to get tangled up in it and be overlaid by the sow.

An hour or so after farrowing the sow should be given a drink of warm water, into which not more than a handful or two of shorts or meal has been stirred. Very little grain should be given the first day; overfeeding with grain during the few days immediately before and after farrowing is apt to derange the digestive system and also to cause trouble with the udder. The feed should be gradually increased until at the end of the first week she is getting all she will eat up clean. Nursing sows should be liberally fed on a ration well adapted to milk production A sow nursing a large litter is subjected to a very severe strain, and if she be a good milker will fall away rapidly in flesh in spite of the most skilful feeding. This, however, is no reflection on the sow; for at no other period in the life of a pig is gain more economically obtained than while sucking its dam. Dairy by-products are especially valuable at this time, and of the grains, shorts or chopped oats are among the best. Barley and corn meal are too heating; the former tends to dry a sow off.

While some variety should be introduced into the sow's ration, extreme or radical changes must be avoided, as this is likely to cause digestive troubles in both dam and offspring.

The sow and her litter should be fed in a wide, flat-bottomed trough so large that when the food is put in it will cover the bottom not more than one inch deep. The young of most animals learn best by imitation, especially of the dam, and if a trough of this kind is used into which the pigs can climb they will learn to eat very rapidly, much sooner than by the plan, so popular with some, of arranging a separate trough for them, from which the sow is excluded. After the young pigs have learned to eat well they may then be given access to separate feeding pens.

In cold weather, the food for the nursing sows should be given warm, and not too sloppy, water being supplied separately. It is also important that both sow and litter have frequent access to earth; it is easily possible to ruin the digestive system of a pig even before it is removed from the dam, and there is perhaps no better corrective for hogs than soil. In cold weather, it must be furnished by artificial means. It is an excellent plan to lay up a supply in the fall for winter use, by piling up a few sods in some place where they will not freeze and can be readily obtained when wanted. These are better if taken from the woods, or some other place where the soil contains a large percentage of humus, or decayed vegetable matter. Failing this, a pailful of earth from the root cellar twice a week will serve the purpose very well.

The litter should be weaned when eight to ten weeks old, by that time they should be eating so well at the trough that they will scarcely miss their dam when she is removed. The whole litter should be removed at once, letting them back to the sow once or twice, if necessary, at intervals of not more than 10 hours, to relieve her udder. It is a quite common practice to leave one or two pigs with the dam for a few days for this purpose. This is a mistake, because each pig will suck only the teat to which he has been accustomed, and will not touch the others, in this way defeating the object for which he was left with the dam.

Sometimes the milk teeth are abnormally long and sharp; when this is the case, they irritate the sow's udder to such an extent that she may refuse to allow the pig to suck. Sometimes too, they grow in such a direction that, while they do not hurt the sow, they lacerate the gums and tongue of the pig until he refuses to take food and in a few days dies of sheer starvation. These milk teeth frequently become discolored from some cause, usually digestive troubles, and are then known as "black teeth." They are easily removed with a pair of pincers and should be attended to as soon as noticed. Many breeders make it a practice to remove them from the

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whole litter when two or three days old; and, although not always necessary, this is, perhaps, the better plan.

PLAN AND DESCRIPTION OF MOVABLE PEN.

The movable pen shown in the accompanying illustration is adaptable to various requirements. It may be used as a shade in summer and a protection from the cold in winter. As a summer pen it should be set in a dry location where the air may circulate freely about it. In summer these pens should be placed in the hog pasture; much better results being obtained if the pasture is a large rather than a small field. As a winter house it should have a sheltered location preferably close to the barn yard.

A pen made of single inch lumber does admirably if well made and all cracks are carefully battened. The battens should be at least 3 inches wide and these securely nailed on, the nails being clinched on the inside to guard against warping.

Whether for summer or winter use a floor is necessary, both for the comfort of the animals and the strength of the pen. Two-inch planking nailed on 4 by 4-inch cedar sills is desirable for the floor. The ends of the sills are shown in Fig. B. It is well to round off the lower ends of the sills making them into runners for moving the pen from place to place. A ring or a U clevis may be fastened to the front or back end of each of the outside sills.

Figures B and C show a form and size of doorway that answers very well for the hogs to go in and out but it is not large enough for an attendant to enter with comfort. It is well to have a doorway at least five feet high. The door should be cut in half so that the upper part may be kept closed when not in use. Many hog raisers hang the lower to the upper half in such a way that the former swings in and out as the hogs enter or leave the pen. In summer the lower door may be hooked up out of the way. On severe winter nights the door may be protected by a heavy curtain or a bank of strawy manure to keep out cold draughts which are always detrimental to a hog's welfare.

A pen arranged for cold weather requires a window in the front (south end) to admit the sun's rays. This may be placed in the upper half of the door or above it.

A pen requires an opening for ventilation Some recommend a hole 3 or 4 inches across at the back, close up to the peak; another form is shown in Fig. B and still another in Fig. D which is perhaps the best.

An 8-ft. pen requires about 200 feet of lumber. Sixteen foot boards are best to use as these cut without waste. This pen would also require 56 feet of scantling for sills, and 64 feet of planking for flooring.

A pen of these dimensions will accommodate from 8 to 10 growing pigs or a sow and litter.

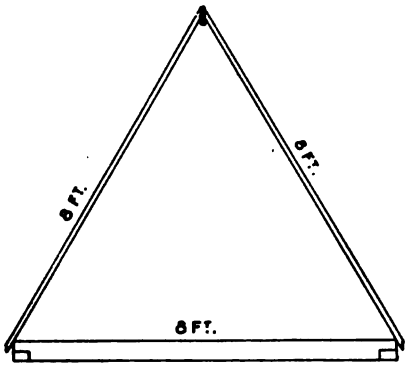

Fig. A.—Showing sills made of 4 x 4 inch scantling, and slope of roof. Two 4 x 4 inch scantlings 16 feet long, make the sills.

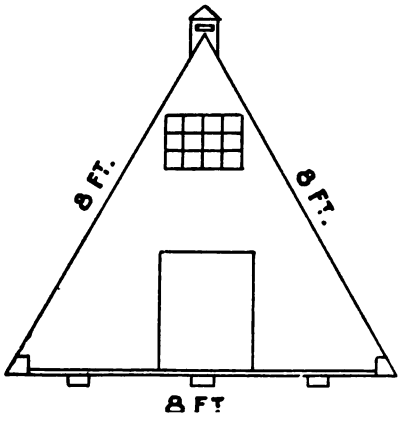

Fig. B.—Front view of portable hog pen, where three scantlings are used as sills.

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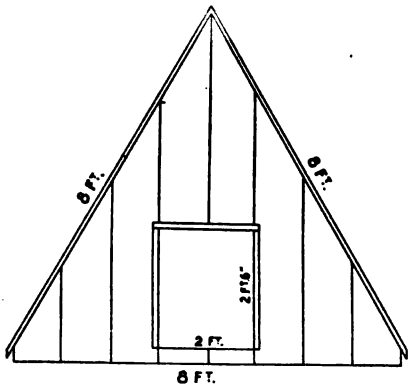

Fig. C.—Front view of Fig. A.

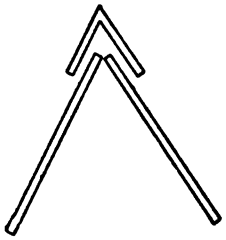

Fig. D.—Showing a method of arranging ridge boards to afford ventilation when pen is intended to have doors closed.

FIG. 19.—THE PORTABLE PEN.

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VI—REARING AND FINISHING.

Care is necessary at weaning time to get the pigs safely over this crisis in their career and well started without any serious set-back. Many breeders sacrifice the profit from a batch of pigs because of lack of skill or care in weaning. Sanders Spencer, speaking on this point, says· "There are more pigs lost or irretrievably ruined when they are first weaned than at any other time in their existence." It is undoubtedly true that many pigs receive a check at this time from which they never recover. A stunted animal of any kind is always unprofitable, and this is doubly true of a pig. With him especially, life is too short to recover losses due to mistakes that might have been avoided.

Among the errors into which one is most liable to fall at this time, is that of feeding a strong grain ration, to compensate for the loss of the mother's milk. The pigs, if well managed, should be eating so freely at the trough as nearly to wean themselves, and no change should be made in the ration, unless it be to add a little skim milk. Even this had better be done some time before the removal of the sow. The loss of the dam's milk, small though it may have become in quantity, is change enough at one time.

Another mistake is that of overfeeding Before the removal of the sow, just as much food should be given, as she and the litter will clean up at each feeding; when the sow is taken away, the feeder, either from mistaken kindness to the pigs, or from a failure properly to estimate their requirements, may overfeed to such an extent that food often lies in the trough from one feeding to another. This is a mistake for two reasons: the weanlings, missing their dam, are tempted to overtax their digestive systems; and the portion of the food remaining in the trough is apt to become foul as a result of fermentation and other causes. In either case digestive troubles will inevitably follow; and these, if not fatal to the pig, are disastrous to the owner's chance of profit. While the other extreme also must be avoided, it is better for a while at least to err a little on the side of underfeeding than to overfeed. Ideal conditions would be to feed at frequent regular intervals as much as they will eat up clean in a few minutes after feeding. It is not often possible to make our practice conform wholly to the ideal, but the nearer we can approach to it the better will be our success.

A mixture of middlings and chopped oats, supplemented with a little skim milk, constitutes an excellent ration for weanling pigs. It is rich in ash and protein for the nourishment of the growing bones and muscles, thus enabling the pig to build up framework rather than to lay on fat. It not only furnishes the right kind of nourishment for a growing pig, but supplies it in a palatable and easily digested form. For pigs under twelve weeks, the oat chop should be passed over a coarse screen, to remove most of the hulls. If this be done, it may be well to add as much bran in bulk as was removed of oat hulls. The bran is more palatable and more easily digested than the oat hulls, and it lightens up the ration, preventing the meal from lying in too close and solid a mass in the stomach. The addition of the bran, however, will depend on the quality of the middlings used, and it devolves upon each individual feeder to exercise his personal judgment in the matter. The nature of the material sold as middlings by different mills varies from coarse, dark colored flour to finely ground bran. The feed stuff the writer has in mind, when speaking of middlings, would consist of about an even mixture of these two materials.

Roots or some other kind of green food, either in the form of pasture or a soiling crop cut and fed in the pen, should be gradually introduced until they constitute about one-half of the ration, by the time the pig is three months old. Many practical feeders are firm in the belief that, in summer, pigs can be most cheaply raised on pasture supplemented with a light grain ration. There is much to be said in favour of the practice, especially since the labour question has become so acute. The hogs, having unrestricted access to earth and taking plenty of exercise, are vigorous and healthy; there is never any trouble with paralysis or with pigs going "off their feed"; and with good fences a large herd can be carried in this way with a minimum of attention, interfering little or not at all with the ordinary operations of the farm.

PASTURING AND SOILING.

Experiments conducted by Prof. Day at Guelph in 1901 and again in 1902 to test the relative economy of pasturing and soiling pigs seem to indicate that cheaper gains are obtained by soiling. In 1901, Prof. Day conducted an experiment in which 34 pigs were fed. Eighteen of these pigs were fed in pens with access to an outside yard, and sixteen were turned into a pasture

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of ordinary tares until Aug. 6 when they were turned into rape pasture. Both outside and inside hogs were fed twice a day what meal they would eat readily. The meal was fed dry, and consisted of two parts barley to one part of middlings by weight. The inside hogs were fed in addition to the meal all the green food they would eat, receiving tares until Aug. 6th and rape after that date; exactly the same forage as that on which the other lot were pasturing. The experiment was commenced on July 6, and on Oct. 14 all of the inside pigs and some of the outside pigs were ready for shipment. Seven Berkshires and three Yorkshires of the outside bunch, were still unfinished and had to be carried over until Nov. 12, when they, too, were shipped to the slaughter house.

The meal consumed per 100 lbs. gain was, as follows:—Group fed on pasture 525 lbs. Group fed in the pens 395 lbs.

The packing house reported on the pigs as follows:—

"The last shipment of hogs which you sent to us is just out of salt, and we have to report to you that all the sides without exception show a very satisfactory degree of firmness. Our bacon inspector's report is that all the sides grade No. 1 in respect of hardness and my own judgment of the sides going over them trying to find differenecs that might be of some value to you, was that there was practically no difference between the different sides, either in the groups themselves, which you designated by A and B, or in contrasting the two groups. Whatever your method of feeding has been in regard to these particular hogs you certainly have discovered some system that gives very excellent results."

Prof. Day sums up the experiment as follows:—

1. In this experiment feeding hogs on pasture proved a very expensive method, whereas feeding in pens with same kinds of food gave reasonably economical gains.

2. The outside hogs ate more meal and made slower gains than those fed inside.

3. All the hogs produced bacon of satisfactory firmness. This confirms the result of a previous experiment with rape, and goes to show that a reasonable supply of green feed with a liberal meal ration produces a good quality of bacon.

4. Succulent food tends to keep animals thrifty, whether it be green food or roots, and thriftiness is conducive to firmness in the bacon produced.

5. The inside hogs consumed, on an average, nearly 4 lbs. of green food each per day, together with 4½ lbs. of meal.

6. As this proportion of green feed to meal is practically the same as the proportion of roots to meal which we have used with good results, it seems safe to assume that the use of equal weights of succulent food and meal tends to produce bacon of firm quality.

7. The time required to attend to the outside hogs was just about half of that required for those inside.

A similar experiment conducted in 1902 resulted in favour of soiling but not to nearly so marked an extent as in the previous year.

It must not be forgotten that the pigs fed in the pens had the run of a small paddock in which they took exercise at will, and had unrestricted access to the clay. Where these conditions do not obtain, so good results cannot be had from soiling. It must also be remembered that, although greater gains may be obtained from a given amount of food consumed, there is a considerable item for labour to be included in the cost of pork produced in this way. Whether or not it will pay any given farmer to pasture his hogs in summer, or to cut green forage and cart it to them in the pens, will depend largely on the facilities he has at his disposal, especially in the matter of labour.

Probably rape is the most valuable crop for this purpose or for pasturing. It grows rapidly and may be sown at successive intervals so as to furnish a continuous supply from the first of June until the frost; it furnishes a large supply of food from a given area; although hogs do not take to it readily at first, they soon acquire a taste for it and eat it freely; and it has an excellent effect on the quality of the product, producing almost invariable a firm carcass.

For hogs, rape should be sown somewhat thickly in rows about 24 to 28 inches apart. Three pounds of seed per acre will give a very good stand, if the seed is fresh and of good quality. If the rape is too thin it grows somewhat coarse in texture and the pigs do not eat it so readily.

Another valuable green crop for hogs is alfalfa. Pigs are fond of it and will make very satisfactory gains, if it is fed with discretion. It should be fed before it blossoms, or it becomes

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too woody, and is not only less palatable, but also less digestible. Common red clover is also excellent; peas, vetches, almost any succulent forage crop may be used with advantage.

For winter feeding, the succulent portion of the ration can be most cheaply and satisfactorily furnished in the form of roots, preferably mangels or sugar beets.

It has been pretty well established that hogs cannot be fed to the best advantage on an exclusive grain diet, especially during the growing period. The result of heavy grain feeding is to check growth, and to cause the pig to lay on flesh and become too thick and fat before the desired weight has been attained.. (See Figs. 4, 6 and 7).

He is the most successful feeder who maintains his pigs on a cheap, bulky, easily digested ration, rich in bone and muscle forming elements, until they reach a weight of from 130 to 150 lbs., then finishes on a stronger ration until they are in "prime" condition but not too fat, and weigh from 180 to 220 lbs.

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VI—COST OF GAIN AT DIFFERENT STAGES OF GROWTH.

As pigs increase in weight, the amount of feed eaten daily, increases rapidly; the daily gain increases also but not in the same ratio; so that the amount of feed consumed per 100 pounds of gain increases with the weight of the pigs. This is well illustrated by an experiment by Prof. G. E. Day at Guelph testing a number of pure breeds of swine. In reporting this experiment Prof. Day says:—

"In the experiments with pure bred hogs a rather interesting point was brought out incidentally. It has been shown by other experiment stations that the cost of producing a pound of gain in hogs increases as the animals become heavier. As our pure bred hogs were weighed at regular intervals and as every pound of meal they consumed was carefully weighed, an opportunity was afforded to test further the truth of the claim, and a statement of the results is given below. These results are computed from the gains made and the food consumed by 36 hogs, so that they afford very conclusive evidence. In computing the average weights of the hogs, fractions of pounds were omitted, the nearest whole number of pounds being taken in each case."

The following is a statement of food consumed for one pound of gain by hogs of different weights :—

"While increasing in live weight from 54 lbs. to 82 lbs., hogs required 3.10 pounds meal per pound of gain.

"While increasing in live weight from 82 lbs. to 115 lbs., hogs required 3.75 lbs. meal per pound of gain.

"While increasing in live weight from 115 lbs. to 148 lbs., hogs required 4.38 lbs. meal per pound of gain.

"While increasing in live weight from 148 lbs. to 170 lbs., hogs required 4.55 lbs. meal per pound of gain.

"This statement shows that there is a steady increase in the amount of meal required to produce a pound of gain as the hogs increase in weight, and is a strong argument in favour of marketing hogs by the time, or a little before, they reach 200 lbs. in weight."

Prof. Henry in his book "Feeds and Feeding" gives the following data which is especially valuable and reliable by reason of the large number of animals fed and reported on; it also agrees with Prof. Day's experiment. The last column will be found especially interesting to the practical feeder. The food used is valued at $1 per cwt.

Weight of pigs in lbs.	Actual average weight.	Number of stations reporting.	Total number of trials.	Total number of animals fed.	Average feed eaten per day.	Feed eaten daily per 100 lbs. live weight.	Average gain per day.	Feed for 100 lbs. gain.	Cost per 100 lbs. gain.
	lbs.				lbs.	lbs.	lbs.	lbs.	$ c.
15 to 50	38	9	41	174	2.23	5.95	.76	293	2.93
50 to 100	78	13	100	417	3.35	4.32	.83	400	4.00
100 to 150	128	13	119	495	4.79	3.75	1.10	437	4.37
150 to 200	174	11	107	489	5.91	3.43	1.24	482	4.82
200 to 250	226	12	72	300	6.57	2.91	1.33	498	4.98
250 to 300	271	8	46	223	7.40	2.74	1.46	511	5.11
300 to 350	320	3	19	105	7.50	2.35	1.40	535	5.35

FOOD OF SUPPORT.

The food required to maintain a hog without loss or gain in weight was investigated by Prof. Sanborn of the Missouri Experiment Station. He found that with hogs varying in live weight from 48 to 175 lbs. a daily ration of middlings equal to about 2 per cent. of the live weight of the

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pigs was required to support the animals without appreciable gain or loss in weight. This, of course, can be determined only approximately as the actual food of support will vary slightly with the individual, but these figures are close enough for all practical purposes. Prof. Sanborn's experiments seem to indicate however, that the ratio between food of support and the live weight of the animal varies inappreciably as the pigs become heavier; that is to say:—Hogs weighing 200 lbs. require about 4 lbs. of middlings, or some other food equivalent to middlings in feeding value, per day, to support life and repair waste of body tissue, while pigs weighing only 50 lbs. can be maintained without loss or gain on about 2½ lbs. of the same food.

This accords with the fact already noted that the cost of gain increases with the live weight of the pigs fed, because the heavier the pig the more feed consumed for which no return is given.

CONDIMENTS OR CORRECTIVES.

Hogs that are closely confined and highly fed require a corrective of some kind to maintain the digestive system in a normal condition of health, and the fatter the pig the greater the necessity. When the digestive organs become clogged with fat, their ability to digest and assimilate is weakened. When a hog is running at large, he does not root up the pasture from pure love of exercise, nor does he do it from innate cussedness. He roots to obtain something for which his system craves. It is this craving that causes a confined pig to gnaw and tear at the trough and the sides of the pen. Hogs have been known to tear apart brick walls in order to get at the mortar. The cause of this unnatural craving is not well understood. It may be due in part to a lack of ash in the food; for as has already been stated a hog may be getting all the grain he can eat and yet be partially starved, because certain requirements of the system are insufficiently supplied. It has been attributed by some to the presence of intestinal worms; and by others to some form of indigestion. Whatever may be the part played in the animal economy by these substances, one thing is clear, that, when they are supplied, hogs are heartier, eat better, thrive better and, consequently, pay better.

Charcoal is probably one of the best correctives; and, when it can be readily obtained, it will pay to keep a supply in some place where the hogs can get at it whenever they wish. The following preparation was that used by the late Theodore Louis, one of the most successful hog feeders in the United States, and found to be an excellent tonic:—

"Take six bushels of corncob charcoal, or three bushels of common charcoal; eight pounds of salt; two quarts of air-slaked lime; one bushel of wood ashes. Break the charcoal well down, with a shovel or other implement, and thoroughly mix; then take one and one quarter pounds of copperas and dissolve it in hot water. With an ordinary watering pot sprinkle this over the whole mass and then again mix thoroughly. Put this mixture into the self feeding boxes, and place where hogs of all ages can eat of the contents at pleasure."

The charcoal furnishes the required mineral matter which may have been lacking in the food, and is also an excellent corrective for digestive troubles, while the copperas is a valuable tonic and stomachic.

If the charcoal is at all hard to get, its place is taken almost as well by sods of earth rich in humus. It is questionable indeed, if there is anything better than sods or vegetable mould taken from the wood-lot. If a small quantity be thrown in each pen daily, it is astonishing to see how much of it the hogs will consume; and the improved health and thrift of the animals will be a revelation to the feeder who has never before tried it.

FEEDING ASHES AND BONE MEAL.

Ground bone, wood ashes, soft coal, old mortar, rotten wood, etc., are also among the substances used and recommended for this purpose. Prof. Henry* reports some interesting experiments to test the value of bone meal and hard wood ashes when given as a supplement to a ration of corn. In all, three experiments were conducted in each of which six pigs were fed. These were divided into three lots and all were fed liberally on corn meal and water. Lot one got nothing else; lot two was given hard wood ashes in a separate trough; lot three was given a spoonful of bone meal mixed with their food at each feeding. The pigs were confined in pens with access to small yards for exercise. These yards were floored with boards to prevent the pigs from get-

*(Feed and Feeding.)

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ting at the earth and eating quantities of it, which those, especially, that were not getting either ashes or bone meal would have done. The various trials lasted from 84 to 128 days.

Concerning the results of the experiments Prof. Henry says:—

"As the trials progressed it became evident that none of the pigs were properly nurtured, though the difference in favour of those getting bone meal or ashes was very marked. The pigs allowed neither ashes nor bone meal were most painfully dwarfed. It was evident that the corn meal, salt and water did not supply all the elements essential to building a normal framework of bone and muscle. These dwarfs became so fat that the jowls and bellies of some of them nearly touched the ground.

"The pigs getting ashes or bone meal grew very well for some time, but toward the close of the trial they made only fair gains, showing that the nutrients supplied were still too limited in character to allow normal development. On slaughter the several lots showed no difference in the proportion of fat to lean, nor was there any difference in the size and character of the various internal organs. The bones, however, were a most interesting study. The thigh bones of these pigs were broken in a testing machine, with the results shown below."

The following table shows results with pigs living on corn meal with or without bone meal and hardwood ashes in addition. (Wisconsin station.)

	When bone meal was fed	When ashes were fed	When neither was fed
Corn meal required to produce 100 lbs. of gain..	487 lbs.	491 lbs.	629 lbs.
Average breaking strength of thigh bones.....	680 lbs.	581 lbs.	301 lbs.
Average ash in thigh bone.....	166 grams	150 grams	107 grams

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VIII—SOFT BACON

Economy of gain is not the only matter to be considered in outlining a system of feeding and management. The quality of the product is of quite equal importance.

In August, 1905, the best Danish and Irish bacon was quoted 13s. per cwt. higher on the English market than the best Canadian. This difference in price, if it could be obtained, would net the Canadian farmer about $1.50 per cwt. live weight more for his hogs than he has been receiving heretofore, which, it is needless to say, would very considerably enhance his profit.

The defect in our bacon of which the English dealers complain the most, and which is chiefly responsible for the difference in the prices above quoted, is the large percentage of soft sides that are continually going forward among Canadian shipments. It is true that the quality of our product has been very much improved during the past two or three years; but there is still much to be done in this regard before we can hope to top the English market, and before our bacon industry can be said to have reached the limit of its possibilities as a source of profit to Canadian farmers.

Soft bacon does not necessarily imply fat bacon. A pig may be thick fat and yet kill out a firm carcass; on the other hand, a thin, underfed pig, like that shown in Fig. 11 is almost sure to be soft. The terms "soft" and "firm" refer to the condition of the fat in a side of bacon when it is taken out of the salt. Sometimes it may be noticed before the bacon goes into the salt; but frequently sides that were apparently firm when put into the salt will come out decidedly soft. Softness reduces the value of a side in proportion to its degree: a very soft side is comparatively worthless; and between this condition and firmness there are many degrees of tenderness. This is a condition entirely beyond the control of the curer. Of many thousand hogs, killed on the same day and put through the same process of curing, some will come out of the salt firm, almost hard; others so soft as to be almost worthless; and others of every conceivable shade of difference between these two extremes. It is clear, therefore, that the remedy must lie with the producer of the hog.

Many theories have been advanced in attempting to account for this softness in our bacon. It has been said to be due to overfeeding and forcing hogs to heavy weights at an early age; but the packers report that they find more softness among thin and unfinished hogs than among the thick fats. It has been said to be due to lack of exercise; and yet, perfectly firm bacon has been produced from hogs that have had very little exercise. The feeding of corn has been said to be responsible; but many soft sides come from pigs that have never tasted corn; and hogs fed on a ration containing a considerable percentage of corn, especially when supplemented with dairy by-products, have produced bacon of the finest quality. Feeding succulent foods, such as rape, clover, or roots, was for a time thought to be the cause; but experiments have shown that these foods, when fed in conjunction with a fairly liberal grain ration, have a decidedly beneficial effect on the quality of the bacon produced. Hogs enclosed in the same pen and fed at the same trough have been found to differ in the firmness of the bacon.

In 1898, Prof. Day commenced a series of experiments to determine if possible some of the causes that may produce soft pork. These experiments have been continued each year since that date, and hogs have been fed on nearly every kind of ration that was likely to be used by the farmer, and kept under all and various conditions practicable. These hogs when finished were shipped to the Wm. Davies Co., of Toronto, who killed and cured them and reported on the quality of the product after coming out of the salt. In this way much valuable information has been obtained, from which the following deductions may fairly be drawn:—

1. An exclusive corn ration, continued for any length of time, will give unsatisfactory gains, and produce soft bacon.

2. Corn as a considerable portion of the ration may safely be used *to finish* thrifty shoats *that have had plenty of exercise* and a ration of mixed grains until they have reached a live weight of 100 lbs.

3. Pigs that have been raised to 100 lbs. live weight on a ration of mixed grain and *skim milk* may be finished on a ration largely composed of corn without any bad effect on the quality of the bacon.

4. An exclusive ration of peas will give unsatisfactory gains which are always associated with inferior bacon, but when fed in mixture with other grains, peas will produce bacon of excellent quality.

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5. Barley, either alone or in mixture with oats or middlings, will produce bacon of the very best quality.

6. Exercise contributes to firmness but will not overcome the bad effect of a faulty ration.

7. Skim milk and whey are exceedingly valuable in their effect on the quality of the bacon.

8. Succulent food, such as roots, rape, clover, etc., when fed to the extent of about half the ration by weight are conducive to the production of firm bacon.

9. Unthrifty, unfinished hogs, or those that have been held for a time on a short allowance to prevent them from becoming too heavy, while holding for improved prices or any other reason, have a marked tendency to softness.

Similar experiments were conducted in 1901 by Prof. Grisdale and Prof. Shutt at Ottawa, and these corroborate the conclusions of Prof. Day.

When all the experimental evidence is reduced to its last analysis, it seems to indicate that the firmness of the bacon depends largely if not altogether on the health of the animal slaughtered, and that any ration or system of management, that will maintain the hogs in a normal condition of health and thrift will produce firm bacon.

(NOTE.—For details of the experiments above quoted, see Reports of the Ontario Agricultural College, for the years mentioned, and Bulletin No. 38 of the Central Experimental Farm, Ottawa.)

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X—FOODS.

BARLEY.

It is only during recent years that Canadian farmers have awakened to a fair appreciation of the feeding value of barley; but, in Great Britain and in Denmark, it has long been regarded as the best of all the cereals for hogs. Its value consists not only in the satisfactory gains obtained from it, but also in the superior quality of the bacon produced. The bacon produced from barley fed hogs is esteemed in England as of the very finest both in flavour and in texture. Barley is, perhaps, the only cereal that can be fed alone with satisfactory results; although, like other grains, it is better fed in combination with something else. Oats, middlings, bran in small quantities, skim milk, and whey, all make excellent complements to feed with barley meal.

In extensive Danish experiments to test the relative values of corn, barley, rye and a mixture of barley and rye, the pigs fed on corn made a little the largest gains per cwt. of food consumed, the lot fed on barley and the lot fed on rye were practically equal to each other, and the lot fed on barley and rye mixed made about the same gains as the lot fed on corn. The corn fed pork was much the poorest in quality.

Prof. Henry reports an experiment in Wisconsin to test the relative values of barley and corn. With pigs averaging 208 lbs. at the beginning of the experiment, 100 lbs. of gain was obtained from feeding 471 lbs. of barley; and on a similar lot of pigs averaging 209 lbs., 100 lbs. of gain was obtained from 435 lbs. of corn; "But," Prof. Henry adds, "when we take into account the fact that the Danes have found barley to be the best single grain for the production of bacon of the highest quality its value in swine feeding is apparent." An interesting feature of this experiment was the fact that the barley fed hogs drank nearly twice as much water as those fed on corn.

Barley is a valuable food for growing hogs, containing all the elements necessary to growth, in about the right proportions. It should, however, be fed very sparingly to nursing sows; it is safer to avoid it altogether, because of its tendency to induce a feverish condition of the system. This affects the milk and trouble with the litter immediately follows. Cases have been reported where the loss of large numbers of sucking pigs was attributed to the too liberal feeding of barley to the dams, and as soon as the barley was stopped the pigs began to do better.

WHEAT.

Wheat has a very high feeding value, producing gains quite equal to those obtained from corn.

At the Central Experimental Farm, Ottawa, experiments were conducted to determine the value of frozen wheat from Manitoba in feeding hogs. On hogs averaging 61 lbs. at the beginning of the experiment and fed until they averaged 165 lbs., 100 lbs. of gain was obtained from 423 lbs. of wheat fed.

In reporting this experiment Prof. Robertson concludes by stating that when hogs are selling at 5 cents per lb. live weight with an allowance of 5 per cent. for shrinkage, frozen wheat fed under the least favourable conditions may realize 43½ cents per bushel. At the same price for hogs frozen wheat fed under favourable conditions in quality and age of the hogs, and preparation of the feed, may realize practically 73½ cents per bushel.

Prof. Henry summarizes experiments at four leading American Stations, as follows:—

Station	Average weight at beginning		No. of days fed	Feed eaten		Feed for 100 lbs. gain	
	Corn meal fed	Wheat meal fed		Corn meal	Wheat meal	Corn meal	Wheat meal
	Lbs.	Lbs.		Lbs.	Lbs.	Lbs.	Lbs.
Kansas	152	163	77	2,294	2,257	439	411
Ohio	136	137	70	1,228	1,273	453	438
S. Dakota	96	103	90	1,159	1,144	458	481
Wisconsin	243	247	63	1,212	1,206	499	522
"	247	247	126	6,014	6,054	496	465
Average	.....	.....	.....	.....	.....	469	463

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It is only during a period of very low prices for wheat that it can be economically used for feeding purposes. Under ordinary conditions it will pay the Canadian farmer better to sell his wheat and buy other feeding stuffs. Damaged grain, however, such as sprouted or frosted wheat, may be turned to a useful purpose by feeding it to hogs.

MIDDLINGS.

The value of wheat shorts or middlings as a food for both young and older pigs is well known. Experiments have shown middlings superior to corn in the proportion of 108 to 100. A combination of the two was found to be 20 per cent. more economical than middlings alone. Shorts has a tendency to produce soft and undesirable pork therefore should never be fed except in combination with peas, barley, corn and other grains. If, however, skim milk or whey is fed in combination with the ration of which shorts forms a part, and in addition to this the hogs get plenty of exercise. the quality of the bacon will be much improved.

Middlings is especially valuable for nursing sows and young stock, because of its high per cent of ash and protein with the additional advantage of having comparatively little fibre. Henry places it next to the by-products of the dairy for young pigs, and this judgment is borne out by the experience of most, if not all, practical feeders.

BRAN.

Like middlings, bran is rich in ash and protein, but its high percentage of fibre makes it unsuitable for very young pigs. As they increase in size, bran may be gradually added to the ration with advantage. Its chief value is to lighten up heavy meals, such as finely ground corn or pea meal, low grade flour, etc., which tend to form so close and dense a mass in the stomach of the animal as to be more or less impervious to the digestive fluids.

PEAS.

Peas are an excellent adjunct to other grains in swine feeding. They are exceedingly rich in protein, and are therefore an excellent complement to corn in compounding a ration for young and growing stock, They are, however, somewhat hard to digest, owing probably to the heavy nature of the meal, and must therefore be fed with discretion. When fed alone for any considerable length of time, they have not given very satisfactory results either in point of gain or in the quality of the product.

OATS.

Oats are a standard food for all kinds of young and growing stock not excepting pigs. They are easily digested and are rich in just the kind of nourishment that the growing animal requires. The one objection to them for pigs is their large percentage of hull, which renders them somewhat unpalatable to small pigs. The stomach of a small pig is limited in its capacity, as compared with that of a calf or lamb, and was not designed for the digestion of any considerable quantity of vegetable fibre. This objection to oats may be overcome by screening out the coarsest hulls. If this be done, perhaps no better ration can be devised for nursing sows or weanling pigs, than a mixture of chopped oats with middlings and a little skim milk. For fattening hogs, oat chop is a valuable addition to corn or pea meal, in the ratio of about one of oats to two or three of corn or peas. The oat chop tends to lighten up the heavy meals, making them more open and digestible.

CORN.

As a cheap fattening food for all classes of farm stock corn stands without a peer. There is little doubt that with mature animals more rapid gains can be obtained at less expense from corn than from any other single cereal. The ease with which it can be produced, its exceedingly high nutritive value, its digestibility and palatability, give the stockmen within the corn belt a long lead in almost every branch of animal industry.

Corn has, however, its limitations, and these are especially marked in the production of high class bacon. The high percentage of starch and fat that it contains, and its relative deficiency in ash and protein make it pre-eminently a fat and heat producing food, and render it quite unsuitable as the basis or main part of a ration for growing stock. In the production of Wiltshire bacon, growth promoting or bone and muscle producing foods are essential. Corn, there-

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fore, cannot be used to any large extent by Canadian pig-feeders, unless it be liberally supplemented with foods rich in those elements in which corn is deficient. Skim milk is the exact complement of corn, and if pigs are getting from three to five pounds of skim milk per day, corn may be fed to the extent of about half of the grain ration, with excellent results, both in economy of gain and quality of product. Or, if hogs are well grown to a weight of say 130 lbs. on a good muscle forming ration, and have had enough exercise to keep them in vigourous health, they may be finished on a ration containing a much larger percentage of corn without any bad effect on the quality of the bacon. But, if corn is made the main part of a ration for a young growing pig, it results in the production of a stunted, undersized, fine boned, light muscled, prematurely fat pig, the carcass of which will almost inevitably cure out soft. It is well to remember that a pig may become fat although insufficiently nourished. A growing pig fed exclusively on corn has more heat and fat producing food than he requires, and he stores away the surplus in the form of body fat, while the growing bones and muscles are partially starved. It is equivalent to putting the siding on a building before the framework has been completed.

RYE.

In its chemical analysis, rye is very similar to barley, although slightly richer in protein. Extensive experiments in Denmark have shown the two grains to be almost equal in value for swine feeding. But although the ground rye itself has given excellent results both in amount of gain and in the quality of the bacon produced, the by-products of rye milling, viz., rye bran and middlings, were found to be very prejudicial to the quality of the product.

BUCKWHEAT.

In experiments conducted at Ottawa, Prof. Robertson found buckwheat to have a feeding value but little inferior to wheat. This is a much better showing than its chemical analysis would lead one to expect.

In this experiment 14 hogs were fed divided into three lots as nearly even in quality as possible.

	Ration fed	Grain eaten per cwt. of gain	Report of curers on quality of bacon
Lot 1. (4 hogs).	Ground barley and wheat	428 lbs.	All firm, best of the three lots.
Lot 2, (5 hogs).	Ground wheat	410 lbs.	Three hogs cured out soft and two firm.
Lot 3, (5 hogs).	Ground buckwheat . .	445 lbs.	One hog cured out soft and four firm.

This experiment, although it does not furnish enough data to warrant any definite conclusions, would seem to indicate that buckwheat has considerable value as a food for swine.

BEANS.

Profs. Grisdale and Shutt found at Ottawa that every pig fed on beans or on a mixture of beans and shorts made very unsatisfactory gains, and the carcasses were all soft.

This accords with the experience of the packers who have observed that shipments coming from the bean growing districts of Ontario, contain a large percentage of "softs". Of course, only damaged beans are fed to pigs at any time, but the evidence is all against them, and Canadian farmers cannot afford to trifle with so fastidious a market as that for high class bacon.

CLOVER (Common Red).

The value of common red clover either as a pasture or as a part of the winter ration for growing pigs is well known. Stewart, in his admirable work "Feeding Animals," reports an experiment in which he fed pigs averaging 75 pounds each with corn meal, two quarts of short cut clover being added to each days allowance and the whole wet with hot water, and allowed to stand from ten to twelve hours before feeding. Another lot received meal prepared in the same way but without the clover mixture. The lot getting clover hay showed the best appetite, the greatest thrift and made the steadiest gains. The pigs getting meal alone gained 110 pounds each in

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120 days, while those having the cut clover hay mixed with their meal gained 143 pounds each or 30 per cent. more.

At the Central Experimental Farm, Prof. Grisdale found steamed clover a very satisfactory substitute for milk, as an addition to a grain ration for growing pigs. The following figures summarizing the experiment are interesting:—

Lot of 6 pigs fed on steamed clover and grain:—

To 6 pigs, average weight 73 lbs. at $4.50 per cwt.	$27.00
¾ tons clover at $5 per ton	3.75
1,475 lbs. meal at 90 cents per cwt.	13.27
Total	$44.02
By 1,085 lbs. pork at $6 per cwt.	$65.10
Profit on lot	21.08
Profit per pig	3.51
Cost to produce 100 lbs. pork	2.63

Lot of 6 pigs fed on grain and milk:—

To 6 pigs average weight 46 lbs. at $3 each	$18.00
1,340 lbs. skim milk at 15 cts. per cwt.	2.01
2,003 lbs. meal at 90 cts. per cwt.	18.03
Total	$38.04
By 1,152 lbs. pork at $6 per cwt.	$71.12
Profit on lots	33.08
Profit per pig	5.51
Cost to produce 100 lbs. pork	2.24

ALFALFA.

Alfalfa seems to be even more acceptable to pigs than the red clover. In a pasture in which the two clovers are mixed, the pigs will eat the alfalfa bare to the ground before touching the other. It is important, therefore, that an alfalfa pasture be not overstocked, as this plant will not stand close cropping.

At the Kansas Station, alfalfa hay has been found a very profitable addition to the winter ration for fattening hogs. The hay used was of first class quality, and was fed whole, as an adjunct to corn. It was given freely so that the pigs ate only the leaves and finer portions, rejecting the coarser stems, which, although charged against the hogs, were used as bedding. It was found that the hogs getting alfalfa hay in addition to their grain, consumed more feed but made much more rapid and economical gains. The hogs receiving alfalfa hay in addition to corn made an average gain of 90.9 lbs. in 9 weeks, while those getting corn alone gained only 52.4 lbs. The gains per bushel of feed were as follows:—

One bushel corn and 7.83 lbs. alfalfa hay produced	10.88 lbs. gain.
One bushel corn alone produced	7.48 " "

At the Utah station, alfalfa hay was fed in addition to a full grain ration of chopped wheat and bran, and the hogs thus fed consumed more grain, and made much larger and more economical gains than those fed on grain alone.

These results, as well as others that might be quoted, if space would permit, indicate that alfalfa has a feeding value in addition to the actual nutrients contained. It stimulates the appetite, aids digestion, and improves the general health and thrift of the animal. It has been shown that anything that will contribute to this result will at the same time tend to the production of firm bacon. The most profitable results at all stations were obtained by feeding all the grain the pigs would eat in addition to the alfalfa. Larger gains for a given quantity of feed consumed were obtained by feeding a limited grain ration and compelling the pigs to eat more of the alfalfa, but much more rapid gains, and better general thrift of the pigs getting a full grain ration in ad-

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dition to the alfalfa was found to yield a large net profit, and to be more satisfactory in every way.

The alfalfa was fed dry either whole or cut into chaff, and separate from the meal. Better results are obtained in this way than by mixing with the meal and thus forcing the pigs to consume an undue amount of it

RAPE.

All things considered rape is, perhaps the most valuable crop for summer roughage. Hogs soon become very fond of it, and if the rape is supplemented with a liberal grain ration, they will make very cheap and satisfactory gains. Like all other bulky forage crops its only value is as a supplement to a grain ration; hogs will not make satisfactory gains on rape pasture alone.

In experiments at Ottawa and at Guelph, rape has proved itself not only to be economical but also to be conducive to the production of bacon of the highest quality.

Prof. Carlyle of the Wisconsin Station conducted a series of experiments to test the value of rape in swine feeding. In one of these, two lots of 17 pigs each were fed as follows:—

Lot 1, was fed corn meal and shorts *ad libitum*, while lot 2 was hurdled on rape and fed the same grain in addition. At the beginning of the trial, the pigs averaged 59 lbs. The average daily gain without rape was .85 lbs. and with rape 1.06 lbs. The grain consumed per 100 lbs. gain by the lot without rape was 437 lbs., by the lot hurdled on rape 420 lbs. The cost per hundred pounds of gain without rape was $2.73, with rape $3.36. Prof. Carlyle concludes: "Pigs are more thrifty, have better appetites, and make correspondingly greater gains when pastured on rape pasture in conjunction with a grain ration, than when fed on grain alone. Rape is the most satisfactory and cheapest green feed for swine that we have fed."

Prof. Craig, late of the Iowa Station, found as a result of two years experiments that an average crop of one acre of rape is equivalent to 2,600 lbs, of a grain mixture consisting of two-thirds corn and one-third shorts.

ROOTS.

Prof. Day of the Ontario Agricultural College conducted an experiment in 1901 to determine the value of roots when fed in conjunction with a grain ration. Four groups of pigs were fed as follows:—

Groups	Total weight Oct. 23	Total weight May 7	Av. daily gain per hog
Experiment A—	lbs.	lbs.	lbs.
Group I —5 hogs; barley and middlings	169	670	.639
Group II—4 hogs; barley, middlings and roots	163	840	.857
Experiment B—			
Group III—5 hogs; corn and middlings	276	940	.677
Group IV—5 hogs; corn, middlings and roots	276	1,020	.757

In experiment A, 319 lbs., and in experiment B, 534 lbs. of roots effected a saving of 100 lbs. meal. These as Prof. Day remarks, are abnormally high values for roots; but the experiment illustrated very well the value of roots when fed in limited quantities. In this experiment the groups getting roots were fed equal parts by weight of roots and grains. It was found that the hogs getting roots made large daily gains and that the tendency was to growth rather than to fatten. It was necessary at the close of the experiment to reduce the amount of roots in order to get the pigs fat enough.

The pigs receiving roots not only made larger and more economical gains, but also produced a finer quality of bacon than the groups fed grain alone.

In Denmark one pound of barley is regarded to be equal to from six to eight pounds of mangels.

The chief value of roots, like that of rape, clover, and alfalfa, lies in their effect on the digestive system. They keep the animals more thrifty, sharpen their appetites, and increase their digestive capacity. It is worthy of note that in every experiment in which anyone of the above forage crops was added to a full grain ration, the pigs made more rapid and cheaper gains than when fed on grain alone, and in these experiments in which the quality of the product is reported,

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it was in every case improved by the addition to the ration of one or another of the foods mentioned.

Of the various root crops, mangels and sugar beets seem to be better adapted to swine feeding than turnips. They are more palatable, and the pigs seem to relish them better, and eat them more readily. Sugar beets have an additional advantage in that they are better keepers than either mangels or turnips and will thus furnish a supply of succulent food during the month of May and the early part of June when not much else is available.

POTATOES.

Prof. Henry of the Wisconsin Station, fed cooked potatoes with corn meal to one lot of pigs and a full corn meal ration to a corresponding lot, and found that 440 lbs. of corn meal fed alone produced 100 lbs. of gain, and that 262 lbs. of corn meal together with 744 lbs. of cooked potatoes produced the same gain. Thus 441 lbs. of potatoes effected a saving of 100 lbs. of corn meal.

If potatoes were fed in conjunction with, say, pea meal or some other substance rich in muscle forming elements they would probably make a better showing. Corn is relatively poor in muscle formers and rich in fat and heat producing elements, and potatoes are doubly so. To add potatoes, therefore, to a corn meal ration is to intensify the evil by widening a nutritive ratio that is already too wide.

The Danes found 400 lbs. of potatoes cooked and fed with skim milk equal to 100 lbs. of grain fed with a similar quantity of skim milk, and found that the quality of the pork produced from potatoes and skim milk was excellent.

Potatoes should in all cases be cooked for pigs. If fed raw, they are very hard to digest and of comparatively small feeding value. The water in which they are boiled should be poured off, as it contains substances prejudicial to health. The feeding value of potatoes consists almost wholly in the large amount of starch that they contain. They are therefore an extremely one-sided food, and should be supplemented with some food stuff rich in muscle formers. For this purpose nothing is better than pea meal, and if some skim milk or buttermilk can be added to the ration, very satisfactory results will be obtained.

DAIRY BY-PRODUCTS.

So valuable are the by-products of the dairy, viz.: skim milk, buttermilk and whey, that they are regarded by many farmers as indispensable in the rearing of young pigs, and it must be acknowledged that, although many feeders are rearing hogs profitably without these foods, much better and cheaper results are possible when a limited amount of milk can be added to the ration. This is especially true in the case of pigs only recently weaned. Milk, being rich in ash and protein, is peculiarly adapted to the building up of the muscles and bony framework of growing animals.

Better results are obtained from skim milk or buttermilk when fed in conjunction with some cereal rich in starch, such as corn or barley, than when fed with other meals too rich in protein, such as gluten meal or pea meal. At the Cornell Station cheaper gains were obtained from corn meal at $14.00 per ton than from gluten meal at $12.00 per ton when each was fed in conjunction with skim milk. It has also been found that milk is most valuable when fed in small quantities, viz.: from 3 to 6 lbs. of milk for each pound of grain fed. Prof. Robertson found that:—

When feeding 2 lbs. of milk per head per day, 163 lbs. of milk effected a saving of 100 lbs. grain.

When feeding 3 lbs. milk per head per day 323 lbs. milk effected a saving of 100 lbs. grain.

When feeding 5.4 lbs. milk per head per day, 533 lbs. milk effected a saving of 100 lbs. grain.

When feeding 15.7 lbs. milk per head per day, 734 lbs. milk effected a saving of 100 lbs. grain.

When feeding 17.1 lbs. milk per head per day, 882 lbs. milk effected a saving of 100 lbs. grain.

As a result of a very exhaustive experiment conducted at the Wisconsin Station under the direction of Prof. Henry it was found that:—

When feeding 1 lb. corn meal with from 1 to 3 lbs. separator skim milk, 327 lbs. skim milk saves 100 lbs. meal.

When feeding 1 lb. corn meal with from 3 to 5 lbs. separator skim milk, 446 lbs. skim milk saves 100 lbs. meal.

When feeding 1 lb. corn meal with from 5 to 7 lbs. separator skim milk, 572 lbs. skim milk saves 100 lbs. meal.

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When feeding 1 lb. corn meal with from 7 to 9 lbs. separator skim milk, 823 lbs. skim milk saves 100 lbs. meal.

Average of all, 542 lbs. skim milk equals 100 lbs. meal

Value of skim milk when fed in combination with corn at varying prices and in different quantities:—

Value of corn per ton	Value of skim milk per 100 lbs. when fed in the following quantities			
	1 to 3 lbs. to 1 lb. corn	3 to 5 lbs. to 1 lb. corn	5 to 7 lbs. to 1 lb. corn	7 to 9 lbs. to 1 lb. corn
$16.00	24c.	17.6c.	14.0c.	14.4c.
$20.00	30c.	22.0c.	17.4c.	18.0c.
$24.00	36c.	26.4c.	20.8c.	21.6c.

When mixed grains are worth $1.00 per cwt., skim milk fed at the following quantities per day is worth as follows per cwt.

2 lbs. per day — 54c. per cwt.
3 " " " — 31c. per cwt.
5.4 " " " — 18.6c. per cwt.
15.7 " " " — 13.6c. per cwt.
17.1 " " " — 11.33c. per cwt.

These results are corroborated by the findings of the Cornell, and also of the Utah Station. Danish investigators also found that the relative gain obtained from milk increased as the quantity fed was decreased. As a result of their experiments they conclude that under ordinary circumstances 600 lbs. of milk may be considered equivalent to 100 lbs. of rye or barley meal.

Buttermilk has a very similar feeding value to skim milk, varying of course with the amount of water added.

Whey also has a very high feeding value when fed in conjunction with a liberal grain ration. Prof. Day found that when feeding about 2 lbs. of whey to 1 lb. of grain, from 750 to 800 lbs. of whey affected a saving of 100 lbs. of grain. Very similar results were obtained at Wisconsin.

The results of experiments conducted at Guelph and at Vermont to test the relative values of sweet skim milk and whey as compared with the same feeds slightly sour, seem to indicate that a little better results are obtained by souring.

It would seem that the acids resulting from a mild fermentation of milk have a beneficial effect on the digestion and general health of the animal to which it is fed, and that this medicinal effect is, if anything, rather more than a compensation for the milk and sugar used up during the process of fermentation. Care must be taken, however, not to allow the fermentation to proceed too far. If the barrels or tanks in which skim milk or whey is kept, are allowed to become offensively foul, deleterious ferments will be formed and good results cannot reasonably be expected.

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X—PREPARATION OF FEED.

Much difference of opinion exists as to the relative economy of feeding grain ground or unground, soaked or dry, cooked or raw etc., and because of the large variety of circumstances that influence more or less the results, it is impossible to say that any one method of feeding is essentially the best. The nature of the feed, the age of the pigs, the cost of grinding or cooking, the price of labor, the season of the year, the nature of the buildings in which the pigs are being fed,—all of these factors influence the relative results to be obtained from contrasted methods of feeding, and must be taken into consideration in determining the best system to adopt on any given farm.

Heretofore the most common practice among Canadian feeders has been to grind the grain as finely as possible, soak it from 12 to 24 hours, and feed it as a slightly fermented slop; but the trend of opinion now among our most experienced feeders seems to be towards dry feeding, giving the necessary drink either at a separate trough or at another time.

SLOP FEEDING.

One of the greatest objections to slop feeding is that in the hands of unskilful feeders there is a danger of making the slop too thin and in this way compelling the pigs to take much more water than is necessary in order to get sufficient nourishment. This mistake is a serious one, especially in cold weather. Water has been said to be fattening but "That depends"; to deprive an animal of the necessary water to satisfy the normal requirements of its system, is to impede the fattening process; but on the other hand, to compel the hog to take into his digestive system a surplus of water on a cold day and in a cold pen, is certainly not conducive to rapid gains. Another disadvantage of slop feeding is that the barrels or tanks in which the food is soaked are sometimes allowed to become rancid, and ferments are engendered that, if not prejudicial to the health of the animal, at least destroy the nutritive value of the food given. Certain substances. such as milk and whey, appear to be improved by moderate souring, but if the fermentation be allowed to proceed too far products are formed which if not absolutely harmful are at least of no feeding value. The products of fermentation vary with the substances fermented. It, therefore, does not follow that because milk is improved by slight fermentation, similarly good results will be obtained from the fermentation of grain.

DRY FEEDING.

One of the disadvantages of dry feeding is that hogs are apt to nose a quantity of the meal out of the trough, which of course means a certain amount of waste. This may be largely overcome by the use of large flat bottomed troughs with square sides. The longer and wider the trough the better, so the meal may be spread as thinly as possible on the bottom. This prevents the hog from gulping his food in large mouthfuls and afterwards slobbering it about the pen. In the opinion of the writer the best method of feeding is that adopted by some of the largest American feeders; viz:—to provide a dry, clean, elevated feeding floor, on which the grain or meal is scattered and the hogs compelled to pick it up in small quantities. By this method all waste is obviated, the food is better masticated and mixed with the saliva, and better digestion and greater gains may be reasonably expected. The water should be supplied in a separate trough, or, better still by means of a drinking fountain attached to a barrel.

In bulletin No. 33 of the Central Experimental Farm, Prof. Grisdale sums up a series of experiments in the following table, which contains some very interesting and valuable data on the matter of whole vs. ground grain, and wet vs. dry feeding.

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Experiment Feed	How prepared	No. of swine	Av. wt at start	Av. wt at finish	Aver. net gain	No. days fed	Aver. daily gain	Aver. amt. feed eaten	Av. amt. feed per 100 lbs. gain
1.			lbs.	lbs.	lbs.		lbs.	lbs.	lbs.
Peas, barley and rye	Whole, soaked 48 hrs	5	69	156	87	119	·73	386	445
2.									
Peas, barley and rye	Ground soaked 12 hrs	5	69	173	104	119	·87	455	436
3.									
Oats, barley, peas and bran	Whole, dry	4	67	175	108	119	·90	441	408
4.									
Oats, barley, peas and bran	ground, dry	4	69	195	126	119	1·06	450	356
5.									
Oats, barley, peas and bran	Whole, soaked 30 hrs	4	66	171	105	119	·88	409	388
6.									
Oats, barley, peas and bran	Ground, soaked 30 hrs	4	66	190	124	119	1·04	467	376
7.									
Oats, peas and barley	Whole, dry	4	103	185	82	76	1·08	307	360
8.									
Oats, peas and barley	Ground, dry	4	101	190	89	76	1·17	307	343

When whole grain was fed, soaking for 30 hours effected a saving of nearly 5 per cent (see exps 3 & 5). When ground grain was fed soaking resulted in a loss of nearly 6 per cent (see exps. 4 & 6).

Prof. Day of the Ontario Agricultural College found that soaking the meal resulted in a loss of something over 8 per cent.* The pigs getting a ration of wheat and barley meal soaked, consumed 489 lbs. of grain per 100 lbs, of gain, while those getting the same ration dry, made a gain of 100 lbs. from 452 lbs. of grain fed.§

At the Indiana Station four lots of three pigs each were fed on a ration consisting of equal parts of corn meal and shorts.

Lot No. 1 received the meal dry.

Lot No. 2 received the meal mixed with its own weight of water.

Lot No. 3 received the meal mixed with twice its own weight of water.

Lot No. 4 received the meal mixed with three times its own weight of water.

In addition each lot received all the water they would drink.

Lot	Ration	Daily gain lbs.	Pounds of grain consumed per 100 lbs. of gain
1.	Meal, dry	4⅓	359
2.	Meal and water 1–1	4⅔	380
3.	Meal and water 1–2	4⅖	374
4.	Meal and water 1–3	4⅕	375

Averaging the results of lots 2, 3, and 4, and comparing with lot 1, we find that soaking resulted in a loss of nearly 5 per cent.

Taken on the whole it is quite evident that under ordinary conditions it is profitable to grind the grain for pigs. The only likely exception is in the case of peas which, if soaked until, they are

* See report 1900. Ontario Agricultural College.

§ See bulletin 86. Ontario Agricultural College.

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soft may be fed whole with very satisfactory results. Some good feeders give their pigs a feed once a day of peas in the straw and allow the pigs to thresh them for themselves. So far as the writer has been able to discover no experimental work has been done to determine the economy of this method of feeding peas, but, if the straw is not wanted for any other purpose than for bedding, the practice has much to commend it. It provides an agreeable change which the hogs appear to relish very much, and it has been pretty well established that anything which contributes to the pleasure of an animal while feeding increases the activities of the digestive system; the pigs are compelled to eat the grain slowly and mastication is therefore more thorough; they are induced to take more exercise and there is a considerable saving of expense for threshing and grinding.

COOKING.

The advisability of cooking or steaming food for swine was for many years the subject of much controversy; many of the most successful feeders both in Canada and in the United States held widely different opinions, and differed quite as widely in their practice. During the past decade however the process, unless in the case of potatoes, has fallen very largely into disuse. It has been pretty conclusively proven that, unless under exceptional circumstances, better results are obtained from a given amount of grain or roots given raw than from a similar amount after it has been cooked.

It was formerly believed, and is still by many feeders, that the process of cooking increases the digestibility of the food; but it has been shown that as a rule the contrary is true, especially in the case of food rich in protein. Extensive experiments conducted both in Germany and in America have been remarkably uniform in their results, and unite to show that protein is less digestible after exposure to high temperature. The digestibility of starch is to some extent increased by cooking and for this reason potatoes should always be cooked for hog feeding. It must be conceded that some feed stuffs such as turnips and pumpkins are made much more acceptable to pigs by cooking and will therefore in some cases give better results cooked than raw; there is also some advantage in giving feed warm during cold weather but both German and American investigators are practically unanimous in condemning the practice of cooking feeds, other than potatoes, that are palatable in their raw state, because it reduces the digestibility of the protein; a loss for which in the absence of any increased palatability it offers no compensating advantages. It is now generally conceded by those who have given the feeding of potatoes a fair study that these tubers fed raw have very little nutritive value, but when cooked they are worth about one quarter as much as mixed grains.

FEEDING EXPERIMENTS.

At the Kansas Station Prof. Shelton fed two lots of pigs on cooked corn and uncooked corn respectively for 90 days. The lot on cooked corn made an average gain per hog of 104 lbs. during that period, while the lot on raw corn made an average gain of 151 lbs.; the lot fed on cooked corn consumed 750 lbs. of grain per 100 lbs. of gain, while the lot receiving uncooked corn consumed only 630 lbs. of grain per 100 lbs. of increase. These figures show a loss of nearly 20 per cent. by cooking. These were very heavy pigs at the commencement of the experiment which accounts for the unusually large amounts of grain consumed in both cases per 100 lbs. of gain.

The Iowa Station compared dry corn meal with cooked corn meal for a period of four months, with the following results:—The lot on dry corn meal made an average gain of 202 lbs. while the average gain on cooked meal was only 142 lbs. The food consumed per 100 lbs. of gain was 417 lbs. of dry meal as compared with 592 lbs. of cooked meal. Here was a loss of nearly 40 per cent. by cooking.

Raw and cooked peas were compared at the Ontario Agricultural College in two experiments. Averaging the two experiments 100 lbs. of gain was obtained from 422 lbs. of raw peas, and from 497 lbs. of cooked peas.

Experiments were conducted for 9 successive years at the Maine Station, in which, without a single exception better results were obtained from the uncooked grains. Similar results were obtained at Wisconsin, Ohio, and other stations; all of which go to show that the cooking of grain results in a loss in feeding value in addition to the expense and labor of cooking.

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WHOLE GRAIN vs. MEAL

Referring again to the table given on page 37 note that in experiments 3 and 4, in which the pigs were quite young at the commencement of the experiment grinding resulted in a saving of a little over 10 per cent., while in experiments 7 and 8, in which the pigs weighed over 100 lbs. at the commencement of the experiment, the grain saved by grinding was scarcely 5 per cent. In experiments 5 and 6, in which the grain was soaked in both cases the saving effected by grinding was about 4 per cent. It will be noticed that in experiments 1 and 2, in which the ration contained no oats, grinding effected a saving of only 2 per cent. Prof. Grisdale observes that "Whenever whole oats are fed a considerable quantity are undigested, due, probably to their thick fibrous hulls."

Prof. Henry of the Wisconsin Station in his report for 1902 sums up a series of experiments to determine the relative value of whole corn and corn meal.

Report	No. of pigs in each lot	Aver. wt. at beginning	Per cent. saved or lost
		lbs.	
1896.....	9	350	8.0 saved by grinding
1896.....	10	224	17.6 saved by grinding
1897.....	9	211	11.0 saved by grinding
1897.....	7	190	9.0 lost by grinding
1898.....	8	185	5.4 saved by grinding
1898.....	8	184	8.4 saved by grinding
1899.....	19	186	2.0 lost by grinding
1900.....	14	175	15.0 saved by grinding
1901.....	12	146	6.0 saved by grinding
1902.....	6	71	1.0 lost by grinding
1902.....	6	80	3.0 saved by grinding
1902.....	6	133	8.0 saved by grinding

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XI—COMPOSITION OF THE LEADING FOODS USED IN SWINE FEEDING.

The subjoined table of composition of foods was compiled from data taken from Prof. Henry's "Feeds and Feeding." The table does not show the *total* amount of each of the constitutents present; it shows the *total* amount of water and of ash and the amount *digestible by cattle*, of each of the other constituents. Comparatively few digestion experiments have been conducted with swine; it is, therefore, impossible, from any data at present available, to compile a satisfactory table showing the amount digestible by swine of each of the nutrients contained in a number of feeding-stuffs. Enough work has been done with swine to show that the digestion by swine of grains and other concentrated foods containing only *a small amount of crude fibre*, is very similar to the digestion of the same foods by cattle or sheep. The difference is so slight that it does not impair the usefulness of a table compiled from digestion coefficients as determined with cattle.

TABLE OF COMPOSITION OF FEEDING STUFFS.

Showing the number of pounds of digestible Nutrients contained in 100 lbs. of the Feed-stuffs named.

Feed-stuff	Water	Ash	Protein	Carbo-hydrates	Fat	Nutritive ratio
	lbs.	lbs.	lbs.	lbs.	lbs.	
Corn	10.9	1.5	7.9	66.7	4.3	1 : 10
Gluten meal	8.2	.9	25.8	43.3	11.	1 : 3
Barley	10.9	2.4	8.7	65.6	1.6	1 : 8
Oats	11	3	9.2	47.3	4.2	1 : 6
Rye	11.6	1.9	9.9	67.6	1.1	1 : 7
Peas	10.5	2.6	16.8	51.8	.7	1 : 3
Buckwheat	12.6	2	7.7	49.2	1.3	1 : 7
Wheat	10.5	1.8	10.2	69.2	1.7	1 : 7
Wheat bran	11.9	5.8	12.2	39.2	2.7	1 : 4
Wheat middlings	10	3.8	12.8	53	3.4	1 : 5
Linseed-meal (new process)	10	5.2	28.2	40.1	2.8	1 : 2
Clover (green)	70.8	2.1	2.9	14.8	.7	1 : 6
Alfalfa	71.8	2.7	3.9	12.7	.5	1 : 4
Rape	84.5	2	1.5	8.1	.2	1 : 6
Sugar beets	86.5	.9	1.1	10.2	.1	1 : 9
Mangels	90.9	1.1	1.1	5.4	.1	1 : 5
Turnips	90.5	.8	1	8.1	.2	1 : 9
Artichokes	79.5	1	2	16.8	.2	1 : 9
Potatoes	78.9	1	.9	16.3	.1	1 : 18
Skim-milk	90.6	.7	2.9	5.2	.3	1 : 2
Buttermilk	90.1	.7	3.9	4	1.1	1 : 2
Whey	93.8	.4	.8	4.7	.3	1 : 7

EXPLANATION OF TERMS USED.

ASH.

This term includes all the mineral constituents of the food, which consists mainly of carbonates and phosphates of potash, lime, magnesia, and soda. In animal nutrition, these mineral constituents of the food are essential to the nourishment and growth of the bony framework. Bone formation cannot take place in the absence of phosphoric acid and lime, hence the great importance of ash in the food of young, growing animals. The well known value of such foods as milk, oats, and bran in the feeding of young stock may be quite largely attributed to their richness in ash. The mineral constituents of the food are important not only to the growing, but also to the fully developed animal. Some of them at least are essential to the operation of the digestive

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juices, and even mature animals will languish and finally die, if wholly deprived of some of these ash ingredients. They are especially important in the nutrition of nursing animals because of the large amount of ash secreted in the milk.

PROTEIN.

This includes all the nitrogenous compounds of the ration. A well known example of almost pure protein is found in the white of an egg. Protein is the only constituent of the food from which flesh (lean meat, or muscle) can be formed; it is also essential in the formation of all the other nitrogenous portions of the body, such as the tendons and ligaments, the hoofs, skin, hair, etc. It is, therefore, not only important but essential that the food of growing animals, in particular, contains a sufficient quantity of protein. The nutritive functions of the nitrogenous compounds of the food are not limited to the formation of similar compounds in the body; they are also used in the production of animal heat, or energy, and in the formation of fat.

CARBOHYDRATES.

Under this heading are grouped a number of substances, the most important of which are starch and sugar, but including also some other compounds closely allied to starch. Their principal nutritive function is the production of heat and energy. It was for a long time believed by animal chemists that this was their only function, but it has now been pretty well established that animal fat also is formed from the carbo-hydrates.

FAT.

This term also includes with the vegetable fats and oils a number of other substances very similar to the fats in their general character. These substances, (sometimes called ether extract) are used in the process of animal nutrition in much the same way as the carbo-hydrates, viz, the production of heat and energy and the formation of fat Fat has a greater value as a heat and force producter than any other constituent of the food, and is believed to be about 2½ times as valuable for this purpose as the carbo-hydrates. It is believed that some of the vegetable fats are deposited in the body as animal fat without any considerable change during the process of digestion.

NUTRITIVE RATIO.

By this term is meant the proportion of digestible protein compared with the digestible carbohydrates and fat. The fat is multiplied by 2.4 to determine its equivalent in carbo-hydrates, and the amount thus obtained is added to the carbo-hydrates. Thus, in calculating the nutritive ratio of corn from the analysis given in the table, the fat multiplied by 2.4 and added to the carbohydrates bring the latter up to 77.02. The ratio of the protein to the carbo-hydrates, therefore, is as 7.9 is to 77.45, or as 1 is to 9.7 or practically 1: 10.

This is regarded as a *wide* nutritive ratio while 1: 3, as in the case of peas, is spoken of as a a *narrow* nutritive ratio. A *balanced* ration is one containing protein (flesh former) and carbonhydrates (heat and fat formers) in just the right proportions to meet the requirements of the animal to which it is fed. It will thus be seen that a balanced ration cannot be calculated with mathematical exactness and that it will vary with the class of animal to which it is fed. The requirements of a growing animal differ from those of a mature animal; therefore, a balanced ration for the one would not be a balanced ration for the other. It may be laid down as a safe rule, sound in principle and borne out by the experience of the best feeders, that a fairly narrow ration (say 1: 5) will give best results with growing stock, while a wider ration (1:7 not exceeding 1:10) is more economical for mature, fattening animals.

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XII—VALUE OF HOG MANURE.

There is a great deal of misconception regarding the value of hog manure. Many hold the belief that it is of much higher value than that from other classes of farm stock. It is true that the manure taken from pig pens is usually much richer in plant food than the general average of farmyard manure; but this is not so much due to any particular merit in the hog, as to the nature of the food on which he is generally fed. The composition of manure varies with that of the food and also to some extent with the animal by which the food is consumed; but the manure from a pig fed on grass and roots is no richer than that from a sheep or a cow consuming the same food; it is, in fact, not quite so rich. The manure, however, from pigs fed on peas or barley is much more valuable than that from cattle fed on poor food such as straw and turnips.

The following table compiled from tables of analysis taken from the year book of the U.S. Department of Agriculture for 1895, shows the total fertilizing constituents contained in 2,000 lbs. of the more common feed stuffs used for swine. The value is based on the cost of obtaining the same in the form of a commercial fertilizer, which would be approximately as follows:—

Nitrogen.....15c. per lb.
Phosphoric acid.....7c. per lb.
Potash.....45c. per lb.

Name of feed stuff	No. of lbs. of fertilizing constituents in one ton, 2,000 lbs.			Value of fertilizing constituents in one ton, 2,000 lbs.
	Nitrogen	Phosphoric Acid	Potash	
	lbs.	lbs.	lbs.	$
Cornmeal	31.6	12.6	8	5.98
Ground oats	37.2	15.4	11.8	7.19
Ground barley	31.0	13.2	6.8	5.88
Ground peas	61.6	16.4	19.8	11.28
Wheat bran	53.4	57.8	32.2	13.50
Wheat middlings	52.6	19.0	12.6	9.79
Wheat (whole grain)	47.2	15.9	10	8.64
Buckwheat	28.8	8.8	4.2	5.13
Rye	35.2	16.4	10.8	6.91
Green clover	10.6	2.6	9.2	2.19
Potatoes	6.4	2.4	9.2	1.54
Mangels	3.8	1.8	7.6	1.04
Turnips	3.6	2.0	7.8	1.03
Skim milk	11.2	4.0	3.8	2.13
Buttermilk	9.6	3.4	3.2	1.82
Whey	3.0	2.8	3.6	.81

The above figures include the total nitrogen, phosphoric acid and potash present in 2,000 lbs of any one of the feed stuffs named. A part of this will be retained and built up into the body tissue of the animal to which it is fed, while the balance is thrown off in the excrement. Swine will excrete from 60 per cent. to 90 per cent. of the nitrogen and ash constituents consumed, depending on the maturity and thrift of the animal. A thrifty growing animal that is building up muscle and bone will retain more of the nitrogen and ash constituents than a mature hog that is adding to its body tissue scarcely anything but fat, consequently the manure from the former is less valuable than that from the latter class of animals.

The Canadian bacon hog is sold, of course, before he reaches maturity; but, if we grant that even 50 per cent. of the fertilizing value of the food is recovered in the excrement, the feeder has in the manure a valuable by-product, constituting in itself a fair profit, at any rate, a liberal compensation for his time and labour.

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XIII—GESTATION TABLE.

The period of gestation in swine is almost invariably 112 days, or 16 weeks. Occasionally an old sow will carry her litter for one or two days longer, and sometimes a young sow will farrow a few days earlier, but as a rule they are remarkably regular in gestation.

The following table is calculated on the basis of 112 days and is convenient for reference. Thus, in keeping a breeding record, which may be on a form similar to that appended as an illustration, if the sow Sally, were mated with Conqueror on January 5th., by consulting the table we see at a glance that she is due to farrow on April 27th., which may be entered on the record at once without any troublesome calculations.

BREEDING RECORD.

Name of Sow	Name of Hog	Date of Service	Due to Farrow
Sally	Conqueror.	January 5th.	April 27th.

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Mated.	Due to Farrow.	Mated.	Due to Farrow.	Mated.	Due to Farrow.	Mated.	Due to Farrow.	Mated.	Due to Farrow.	Mated.	Due to Farrow.	Mated.	Due to Farrow.	Mated.	Due to Farrow.	Mated.	Due to Farrow.	Mated.	Due to Farrow.	Mated.	Due to Farrow.	Mated.	Due to Farrow.
Jan.	April	Feb.	May	Mar.	June	April	July	May	Aug.	June	Sept.	July	Oct.	Aug.	Nov.	Sept.	Dec.	Oct.	Jan.	Nov.	Feb.	Dec.	Mar.
1	23	1	24	1	21	1	22	1	21	1	21	1	21	1	21	1	22	1	21	1	21	1	23
2	24	2	25	2	22	2	23	2	22	2	22	2	22	2	22	2	23	2	22	2	22	2	24
3	25	3	26	3	23	3	24	3	23	3	23	3	23	3	23	3	24	3	23	3	23	3	25
4	26	4	27	4	24	4	25	4	24	4	24	4	24	4	24	4	25	4	24	4	24	4	26
5	27	5	28	5	25	5	26	5	25	5	25	5	25	5	25	5	26	5	25	5	25	5	27
6	28	6	29	6	26	6	27	6	26	6	26	6	26	6	26	6	27	6	26	6	26	6	28
7	29	7	30	7	27	7	28	7	27	7	27	7	27	7	27	7	28	7	27	7	27	7	29
8	30	8	31	8	28	8	29	8	28	8	28	8	28	8	28	8	29	8	28	8	28	8	30
	May		June																		Mar.		
9	1	9	1	9	29	9	30	9	29	9	29	9	29	9	29	9	30	9	29	9	1	9	31
																							April
10	2	10	2	10	30	10	31	10	30	10	30	10	30	10	30	10	31	10	30	10	2	10	1
					July		Aug.				Oct.				Dec.		Jan.						
11	3	11	3	11	1	11	1	11	31	11	1	11	31	11	1	11	1	11	31	11	3	11	2
									Sept.				Nov.						Feb.				
12	4	12	4	12	2	12	2	12	1	12	2	12	1	12	2	12	2	12	1	12	4	12	3
13	5	13	5	13	3	13	3	13	2	13	3	13	2	13	3	13	3	13	2	13	5	13	4
14	6	14	6	14	4	14	4	14	3	14	4	14	3	14	4	14	4	14	3	14	6	14	5
15	7	15	7	15	5	15	5	15	4	15	5	15	4	15	5	15	5	15	4	15	7	15	6
16	8	16	8	16	6	16	6	16	5	16	6	16	5	16	6	16	6	16	5	16	8	16	7
17	9	17	9	17	7	17	7	17	6	17	7	17	6	17	7	17	7	17	6	17	9	17	8
18	10	18	10	18	8	18	8	18	7	18	8	18	7	18	8	18	8	18	7	18	10	18	9
19	11	19	11	19	9	19	9	19	8	19	9	19	8	19	9	19	9	19	8	19	11	19	10
20	12	20	12	20	10	20	10	20	9	20	10	20	9	20	10	20	10	20	9	20	12	20	11
21	13	21	13	21	11	21	11	21	10	21	11	21	10	21	11	21	11	21	10	21	13	21	12
22	14	22	14	22	12	22	12	22	11	22	12	22	11	22	12	22	12	22	11	22	14	22	13
23	15	23	15	23	13	23	13	23	12	23	14	23	12	23	13	23	13	23	12	23	15	23	14
24	16	24	16	24	14	24	14	24	13	24	15	24	13	24	14	24	14	24	13	24	16	24	15
25	17	25	17	25	15	25	15	25	14	25	16	25	14	25	15	25	15	25	14	25	17	25	16
26	18	26	18	26	16	26	16	26	15	26	17	26	15	26	16	26	16	26	15	26	18	26	17
27	19	27	19	27	17	27	17	27	16	27	18	27	16	27	17	27	17	27	16	27	19	27	18
28	20	28	20	28	18	28	18	28	17	28	19	28	17	28	18	28	18	28	17	28	20	28	19
29	21			29	19	29	19	29	18	29	20	29	18	29	19	29	19	29	18	29	21	29	20
30	22			30	20	30	20	30	19	30	21	30	19	30	20	30	20	30	19	30	22	30	21
31	23			31	21			31	20			31	20	31	21			31	20			31	22

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XIV—THE PRESENT AND THE FUTURE OF THE CANADIAN BACON INDUSTRY.

While each of the Provinces of Canada contributes hogs to the bacon industry, from 80 to 90 per cent of the annual pack comes from Ontario farms. The hogs raised in Quebec up to the present time have been consumed largely within the province. An effort is now being made by the Dominion Department of Agriculture to introduce, by a system of auction sales, hogs suitable to the requirements of the export trade. In the Maritime Provinces the raising of hogs is not as extensively carried on as it should be. In fact only in the dairying sections are any produced for packing. The farmers of Prince Edward Island are doing more proportionately in this line than any of the other Atlantic Provinces but the output of hogs for 1905 was considerably less than during the previous year and only a very small proportion reached the export trade. In the West there may be important developments within the next few years. Damaged wheat, cheap coarse grains and the influx of United States farmers all point to increased hog raising and the consequent establishment of packing centres at Western points.

The production of hogs has made marked progress in Canada during the past fifteen years. In 1890 there were about 200,000 hogs marketed; in 1904 the number was fully 1,700,000. In the former year there were but two packing houses in the export trade with a weeky capacity of perhaps 3,000 hogs; in 1904 sixteen packing houses, with a capacity of at least 50,000 a week were in operation. According to the statements of the managers of these various houses at no time have these institutions been taxed to cope with the hogs offering. In fact the supply has not exceeded from 20,000 to 35,000 hogs weekly, according to the season of the year, so that conditions have favoured an active competition for the hogs.

The output of Canadian packing houses is largely exported. Eighty five per cent of the total pack finds its way to the English market. Great Britain's weekly supply of bacon during the year comes from the various sources about as follows;—From the United States the product of about seventy thousand hogs; Denmark about thirty five thousand; Canada about thirty thousand; Ireland about ten thousand and continental Europe the product of about five thousand hogs per week.

It will thus be seen that Canadian bacon is about twenty per cent of the total quantity imported by Great Britain. This, considering the importance of our agricultural and dairying industries, can scarcely be regarded as a satisfactory percentage. Moreover, we are scarcely holding our position in relation to other countries. Denmark has improved her position during the last five years by about forty per cent, while during that time Canadian exports have been practically stationary.

Numerous causes may be cited for the difference in the progress made in hog raising by Canada and Denmark. In the latter country a thorough system of co-operation is in progress not only in a united endeavour to produce hogs of only the desired weights and form, but also to keep up a regular supply throughout the year and from year to year. In Canada it is quite different. While the improvement in the quality of hogs produced has for a number of years been very general it has not been nearly so pronounced as it would have been with greater co-operation. Nor is the supply of hogs in Canada as regular as in Denmark either throughout the year or from season to season. Raising hogs in fair quantity when prices are high, going out of them, in whole or in part, when prices are low, too many farmers deny themselves the advantage of a good average price, and make impossible a steady inroad into the English bacon market which must have quantity—and steady quantity at that—to back it up. Such spasmodic support, now blowing hot, now cold, spells ruin to the Canadian bacon trade, because the English customer is, in the main, a conservative and consistent purchaser of one brand of bacon. If his supply falls short he seeks another more regular source of supply, and as a rule depends upon it as long as it continues to be satisfactory.

The Canadian farmer is not alone to blame for the lack of regular supply which would keep up and steadily increase if a fair price were assured throughout the year. Nor is the packer at all times responsible for the price as in many sections there exists a troublesome middleman known as the "gentleman" drover who in some cases controls the situation. These men engage others who do the actual buying and both have their share of the profits. Then the system of "F.O.B." buying has been inaugurated, which to a great extent does away with the culling of hogs which is generally done when they are delivered at the packing houses. This means that all kinds bring the same price irrespective of their suitability for the bacon trade. Another factor which must not be overlooked is the values for bacon on the British market.

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In Denmark by means of the system of co-operation, very generally in practise, the farmers run the packing houses, in fact the packing is as much their own business as the breeding and feeding. This does away with the middleman and other factors which come between the farmer and the market, interfering with the balance of trade and consuming profits which belong to the producers.

In Canada co-operative hog raising and packing received a serious blow a few years ago when a number of quite extensive farmers' packing houses were built and operated as such for only a brief period. The undertaking was so entirely overdone that there were not sufficient marketable hogs in the country to keep the plants running profitably. Competition for hogs was so keen that the prices offered were out of proportion to the market for bacon and only the old established houses could withstand the strain. The farmers' plants closed up, and most, if not all, of them have been taken over by joint-stock companies or private concerns. One of the great difficulties experienced by the farmers' packing houses was the lack of loyalty by members to the co-operative movement. If a slightly increased price were offered many hogs pledged to the co-operative plants were allowed to go to the other factories and soon the spirit of co-operation gave place to competition. Whether or not the experience cited is a fair test of co-operative bacon production there is little probability of the system being repeated to any extent in the near future.

During the season of 1905 several features have retarded the extension of our bacon trade. With fair to good prices throughout the season the packing houses have not had sufficient hogs of any sort to keep their plants going at anything like their full capacity.

Another unfavorable feature of the present situation is a growing tendency on the part of farmers to market their hogs in an unfinished condition, Sometimes from lack of grain, oftener through fear of taking lower prices later, hogs are sold in such condition, or at such weights, that the whole trade suffers from a surfeit of light weight or unfinished product.

The bacon industry of Canada, worth some fifteen million dollars annually, is surely worthy of the earnest support of farmers. The chief weaknesses are the irregular supply and a failure to meet the requirements of the trade by not producing the type of hog called for. The difficulty regarding supply may be overcome by a closer study of the question of cheaper production. The farmer who feeds his hogs in a close pen on an almost exclusive diet of grain for six months or longer is not going to continue to raise pork for the reason that he cannot make it profitable. He must use green crops, roots, dairy by-products and other refuse, and care for his animals in such a way that the very best returns will be received from the food given.

The most urgent need of the bacon industry is a steady persistent support begotten of the belief that year in and year out hog raising pays when pursued along right lines. If this is done there are great possibilities for Canadian bacon. Because of distance from market and the demand for an exceedingly mild cured article, Canadian bacon has not, up to the present time, sold on even terms with the best Irish or Danish brands, which are within a couple of days of the market. However, with improved cold storage facilities on steamship and at British ports, the difference in price between Canadian and the more popular European brands may be overcome and the finest Canadian should then bring the top price paid for bacon in Britain. Our bacon occupies a position some shillings per hundred weight better than American and with its growing popularity with the English consumer, it should be the bacon of the people in just the same way that Canadian cheese is the cheese of the people of Great Britain. That it may occupy this position however, there must be, on the part of the farmers persistent and increased raising of hogs during periods of low prices as well as high; the hogs marketed must conform to market requirements as regards type, quality and weight as described in the foregoing pages of this bulletin; there must be on the part of packers such care in the curing and marketing of the product as will steadily build up its reputation for quality and uniformity, that its position in relation to other brands on the English market may be gradually improved. If in addition, relations of confidence are maintained between packer and farmer, through open fair dealing and intelligent co-operation in the common problem there is no reason why Canadian bacon, like Canadian cheese should not become a prime necessity to the British consumer.

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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
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BRIEF HISTORY, CHIEF CHARACTERISTICS
AND POINTS OF EXCELLENCE

OF

LEADING BREEDS OF SWI

REARED IN CANADA

BULLETIN No. 11

Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottaw
JANUARY, 1907

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DEPARTMENT OF AGRICULTURE, CANADA,

OFFICE OF LIVE STOCK COMMISSIONER,

OTTAWA, January 10, 1907.

To the Honourable

The Minister of Agriculture,

Ottawa, Ont.

SIR,—I beg to transmit herewith a bulletin being a 'Brief History, Chief Characteristics and Points of Excellence of the Leading Breeds of Swine Reared in Canada,' and would recommend that it be printed for distribution.

I have the honour to be, Sir,

Your obedient servant,

J. G. RUTHERFORD,

Live Stock Commissioner.

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LEADING BREEDS OF SWINE.

THEIR ORIGIN, DEVELOPMENT AND POINTS OF EXCELLENCE.

INTRODUCTION.

Almost all countries within the temperate zone have had their wild hogs. It is generally believed that the different varieties are all descended from one original stock. According to historians, the original wild hog was of a rusty grey colour when young, the colour deepening as the animal reached maturity and becoming a dark chestnut brown, its hairs tinged with grey at the extremities, as old age crept over it. Climate and soil undoubtedly affected the colour as well as the form to a considerable extent. It is chronicled that the native swine of Sierra Leone were small in size and bone, with comparatively little lean meat, and nearly black in colour; in New Zealand the original swine were much the same. In Siberia the swine are stated to be very small and of a slate colour. The native hog of China is delicate and sensitive to cold; in form its body is low and trailing with drooping back and thin hams. The delicacy of its flesh, the tendency to fatten, and prolificacy are its chief considerations. The hog of Naples is black and without bristles; it has a leg of medium length and a very cylindrical and symmetrical body. The quality of the flesh is good, but the animals are not hardy and are little adapted for general use in more northern climates. Thus we see that before the work of systematic improvement began the hog stock of the world differed very materially according to the environment in which they were placed.

With the advance of agriculture there came about a corresponding improvement in farm animals, including hogs. The best specimens were perpetuated, more generous feeding was resorted to, and improved foreign blood was introduced. In the formation of the present popular breeds, crosses of the hogs of China and Naples were found to be of much advantage in reducing coarseness of form and of flesh. The continued and progressive improvements in the breeding of swine led to the formation of the present distinct breeds. The fancy of the breeder and the local use of peculiar articles of consumption, together with the quantity and kind of food given, have contributed to fix the various types. The large improved breeds have been produced by propagating from the best specimens of the old English hog, by persevering in judicious selection, and by the altered circumstances of maintenance and domesticated accommodation. Confinement in sheltered abodes, along with an ample supply of food, soon effected great and lasting changes in the entire conformation of the body of the hog. The narrow erectness of the back of the forest ranger was depressed until it was nearly level from the head to the tail; the ribs were much more curved, largely increasing the lateral extension of the carcass; the snout was shortened, the head widened, and the long, pendulous ears were much reduced in size. The widening of the body brought it nearer the ground, shortening the legs and expanding the frame. With these changes there came about breeding to type and colour in the various localities, as suited the requirements and desires of the hog raisers, resulting, in the course of time, in the establish-

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ment of the present pure breeds which are to be found throughout those countries where advanced agriculture is carried on.

While many pure breeds of swine have been evolved and are bred for meat production, only a comparatively small number have become popular in Canada, and the tendency is towards a further reduction of this number. During the past two decades the tendency had been towards the production of hogs suited to the requirements of the bacon trade, with the result of popularizing those breeds best adapted to this purpose.

The breeds of swine most commonly bred from in Canada are the Yorkshire, the Tamworth, the Berkshire, and the Chester White. The Poland-China and the Duroc-Jersey are also bred to some extent. The Yorkshire and the Tamworth are recognized as being especially suitable for bacon production; while the Berkshire and the Chester White of the improved type occupy an intermediate position between the bacon and the lard types. The remaining two belong to the fat or lard producing class, very popular in the corn belt of the United States. The relative numerical standing in Canada of the breeds named is fairly well indicated by the fact that in 1906 there were in the membership of the Dominion Swine Breeders' Association 185 breeders of Yorkshires, 147 of Berkshires, 37 of Tamworths, 28 breeders of Chester Whites, 8 of Poland-Chinas, and only 3 of Duroc-Jerseys.

Pedigrees of pure bred swine of any of the breeds described in the foregoing pages may be recorded in the Dominion Swine Breeders' Record. Members of the Dominion Swine Breeders' Association are charged for registration, including certificate, 50 cents each; non-members, $1; transfers, 25 cents each. The cost of membership in the Dominion Swine Breeders' Association is $2 per annum. Application forms, giving rules of entry, may be procured from the Accountant, National Live Stock Records, Department of Agriculture, Ottawa.

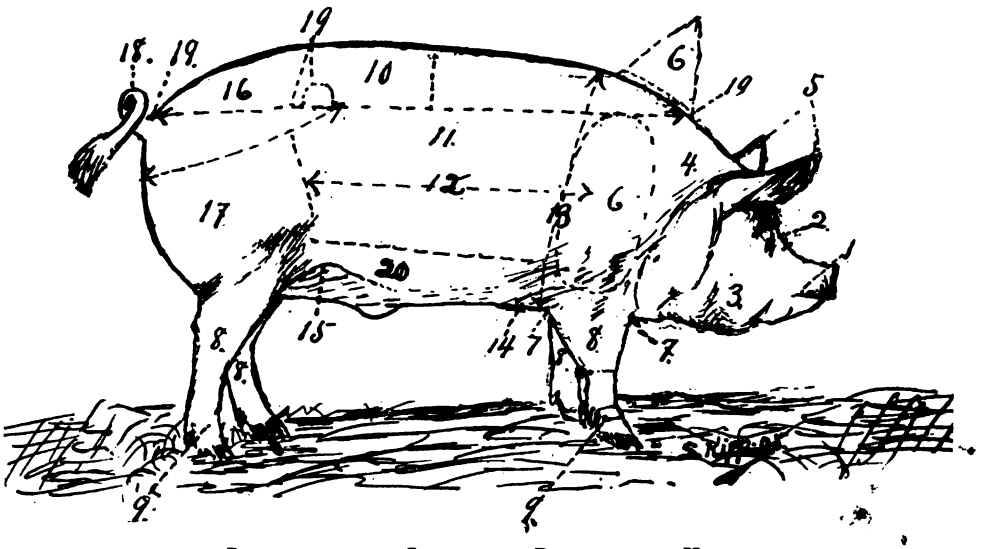

DIAGRAM SHOWING LOCATION OF POINTS OF THE HOG.

1. Snout.	5. Ears.	9. Pastern.	13. Girth.	17. Ham.
2. Face.	6. Shoulder.	10. Loin.	14. Fore-Flank.	18. Tail.
3. Jowl.	7. Chest.	11. Ribs.	15. Hind-Flank.	19. Back.
4. Neck.	8. Leg.	12. Side.	16. Rump.	20. Belly.

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THE YORKSHIRE.

The Yorkshire hog of to-day is claimed by historians of the breed to have descended almost directly from the old English hog common in the northern counties of England as far back as the beginning of the eighteenth century. This hog was long in head and body and stood high off the ground. He was narrow in body, coarse in bone, had very large ears, and took a long time to mature.

Little was done to improve the breed until about 1760, when Robert Bakewell, the famous stock improver of that time, is said to have applied the principles by which the English Leicester sheep was evolved from the old type. This was to perpetuate only the smaller, finer and more compact animals, which he found had a greater aptitude to fatten than the more rangy and coarser types. Some authorities claim also that the Yorkshire was much helped by the introduction of crosses of the White Leicester, a breed of swine of a finer and thicker type than the Yorkshire was at that time.

There appears to be comparatively little knowledge of the improvers of the breed during the early part of the nineteenth century, but it is probable that many farmers had a hand in the work. The Yorkshire man, as is well known, is a lover of good stock, and it is not surprising to find that the swine kept in the county of York were equal, if not superior, to those found in any other part of the country. With the advent of competition at the district week-end fairs, the general farmer was incited to improve his stock, until, some fifty years ago, it was not unusual to find the displays of pigs at the best of those fairs quite as good as those seen at much larger shows in other districts. Unfortunately, the classification at the district meetings was not such as tended to purity of breeding, the prizes very frequently being offered for the best pigs of a particular colour, which in Yorkshire was chiefly white. This led breeders to pay close attention to the securing of size, easy fattening and early maturing qualities, irrespective of those points which are looked for in an established breed. The improvement effected was marked and rapid, and owners were able to bring out heavily-fleshed boars and sows of fine quality for the classes limited to pigs under six, nine and twelve months old—classes which were looked upon with special favour by the exhibitors at the district summer shows.

Owing to a lack of unison on the part of breeders, improved animals found in different localities and in different herds were of quite dissimilar type; and it was not until about 1860, when a classification for Yorkshires was provided by the leading shows, that the type of the large Yorkshire was well fixed.

The improved Yorkshire is one of the largest breeds of swine. It is longer than any of the others, but its thickness is not so great as those breeds which have been developed chiefly for heavy weights and the production of fat. It grows rapidly and the quality of its meat is unexcelled, as its long, deep sides produce much bacon of the desired lean class.

For crossing or grading purposes the improved Yorkshire is unsurpassed on account of its size, vigour, muscular development and other desirable qualities which it strongly transmits to its offspring. The sows have large litters of uniform pigs, of which they rear a good proportion. They seldom become clumsy at farrowing time, a vicious

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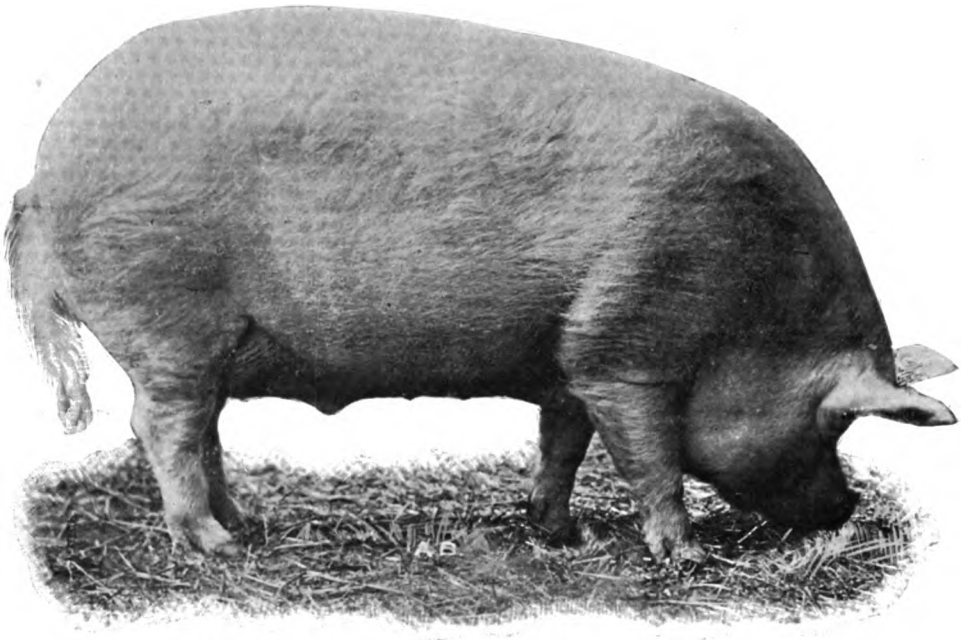

YORKSHIRE BOAR.

WINNER OF FIRST PRIZE AT THE ROYAL, BATH AND WEST, HIGHLAND, AND OTHER BRITISH SHOWS.

YEARLING YORKSHIRE SOW.

WINNER OF FIRST PRIZE, ONTARIO WINTER FAIR, GUELPH, 1906.

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dam is almost unheard of in the breed, and they are excellent nurses, while the young are vigorous from the first.

Improved Yorkshire swine have been imported into Canada for many years. Many specimens of the early importations, and of even those brought out as late as 1890, were of the coarse, rangey, slow maturing sort. Where these were distributed the Yorkshire breed did not grow in favour. In recent years, however, the tendency has been to revert somewhat from the extreme length and size which were held in favour by the early breeders of bacon pigs, until the modern Yorkshire is a smooth, lengthy animal that matures fairly early and makes very economical gains either in the pen or on pasture upon the food it consumes. Animals of this breed are active and yet gentle in disposition, and they very rarely go off their feet. A mature boar in show condition should weigh not less than 700 lbs., and a mature sow 600 lbs. Well nourished pigs from six to seven months old should reach a marketable condition weighing from 180 to 220 lbs.

The typical Yorkshire is long and deep in proportion to width; symmetrical and smooth; its back is slightly arched; the ribs well sprung; its underline and sides trim, straight and level and its body is firmly supported by well placed legs of medium length.

The points of excellence for Yorkshire swine should conform as nearly as possible to the requirements of the bacon trade, with due regard for constitutional vigour and easy feeding qualities.

The following scale prepared by the members of the staff of the Live Stock Commissioner is believed to correspond with the points of the ideal Yorkshire as seen in the leading show yards of the present day. It is general inasmuch as it applies to the Yorkshire breed irrespective of sex. Due allowance must, therefore, be made when scoring mature boars and breeding sows granting masculinity in the former and matronly conformation in the latter.

SCALE OF POINTS.

		Student's Score.
Colour—		
White, free from black hairs, and as free as possible from blue spots on the skin	2	
Head and Neck—10 points—		
Face slightly dished, broad between eyes, poll wide and prominent	2	
Snout, moderately strong but not coarse, of medium length, turning upward with slight curve	1	
Eyes, good size, full and bright and wide apart	1	
Jowl, neat form and of medium size without flabbiness, having good width at the angles of the jaw	2	
Neck, medium length and muscular, with little tendency to arch on top in the case of sows and barrows	3	
Ear, medium to large in size, with fine fringe, standing well out from the head, not drooping, and inclining slightly forward	1	

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SCALE OF POINTS—*Continued.*

		Student's Score.
Forequarters—14 points—		
Shoulders, full, smooth, rounded from side to side, not open on top, compact, no wider than back	8	
Breast, good width and full; chest full and low	4	
Fore-legs, set well apart, medium length and straight; pasterns upright, bone clean and moderately fine; feet compact without tendency to spread when walking	2	
Body—40 points—		
Back, medium width, rising slightly above the straight line and forming a very slight arch from neck to tail	9	
Loin, muscular and full, but not unduly arched, wide as rest of back	5	
Ribs, well arched from back, dropping straight, giving flatness to the side	3	
Side, deep, long, smooth and straight between shoulder and ham, a straight edge laid over shoulder point and ham should touch the side throughout	12	
Heart-girth, full, but without flabbiness or wrinkling; there should be no tucked-up appearance back of fore legs, nor slackness back of shoulder top	5	
Flank, full and low	1	
Underline, straight; the belly should be markedly trim and neat unless in case of broad sows	5	
Hindquarters—14 points—		
Rump, same width as back, long and slightly rounded from a point above hips to tail, and rounded from side to side over top	5	
Ham, full without flabbiness, thigh tapering toward hock, carrying flesh well down both inside and outside of bone	4	
Hind legs, medium length, hocks set well apart but not bowed outwards; pasterns strong and upright; feet, compact without tendency to spread when walking.	4	
Tail, set high, medium strength, inclined to curl, with tassel of fine hair	1	
Quality—15 points—		
Ear, rather thin, firm and of medium size (1) hair, fine and abundant without curl or bristles (2); skin, smooth, showing no tendency to wrinkle (3); bone, strong and clean in legs, moderately fine in snout and head, and showing no prominence on side and top of shoulder (4); flesh, firm and smooth, with no flabbiness at jowl, fore-flank, belly or ham (5)	15	
Style—5 points—		
Active in movement, walking without a swaying motion and standing well up on pasterns	5	
Perfection	100	

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Objections.—Narrow or excessively broad or sagging back; too thin or too short, thick or arching neck; sagging belly unless in brood sows; small cramped chest; pronounced depression back of shoulder; heavy shoulder; heavy shields on shoulders of boars; wrinkled skin; crooked or deformed legs or feet; black hairs, black spots, curly coat or swirls; very short or very long snout.

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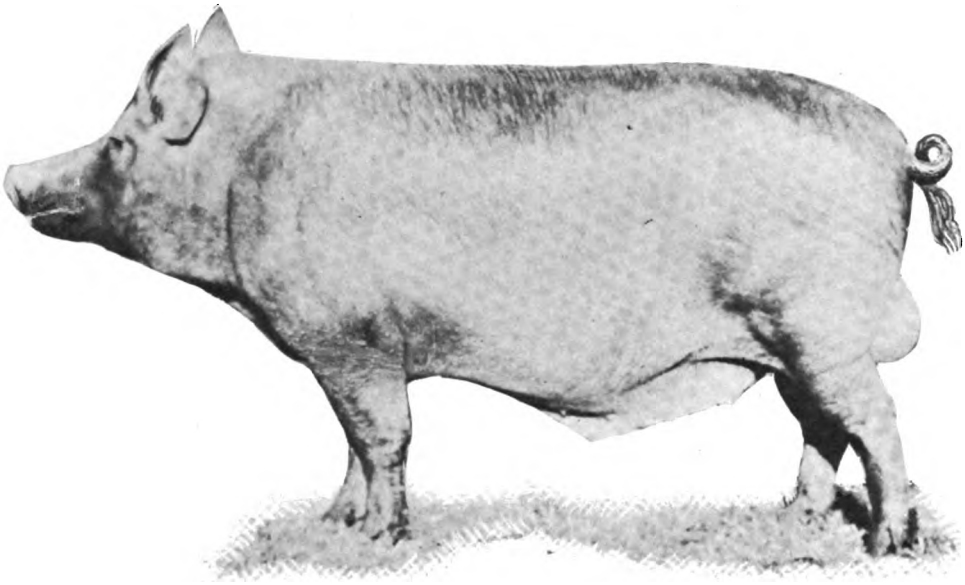
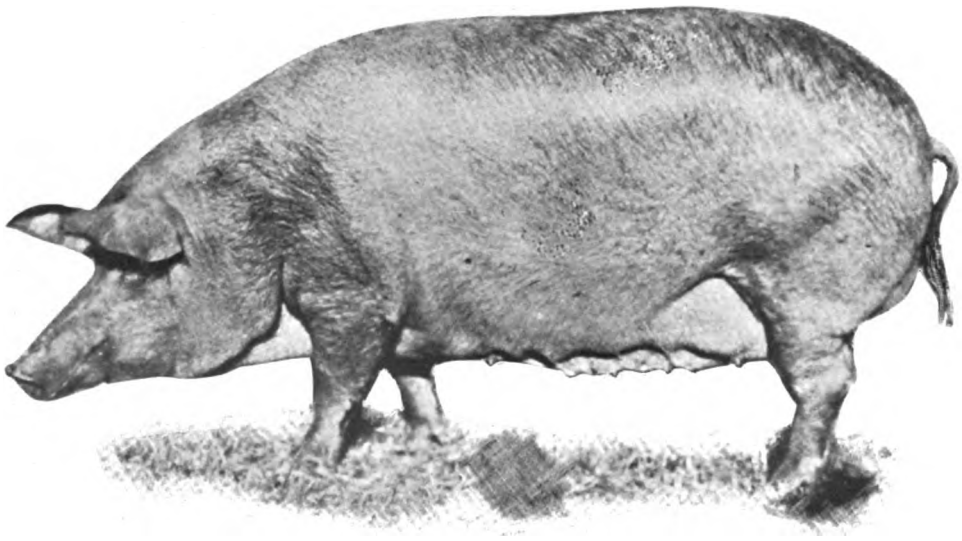


MATURE TAMWORTH BOAR.
WINNER OF SWEEPSTAKES AWARD, CANADIAN NATIONAL EXPOSITION, 1906.



MATURE TAMWORTH SOW.
WINNER OF SWEEPSTAKES AWARD, CANADIAN NATIONAL EXPOSITION, 1906

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THE TAMWORTH.

The Tamworth is probably the purest of the modern breeds of swine; it having been improved more largely by selection and care than by the introduction of the blood of other breeds. One historian claims that foundation stock was introduced into England from Ireland by Sir Robert Peel about 1815, but others speak of its being plentiful in the Midland counties of England previous to that date. Sir Robert Peel is said to have maintained a herd of this sort near the town of Tamworth (from whence the breed takes its name), in South Staffordshire until the time of his death, in 1850.

During a long period the breed was little seen outside of the counties of Leicestershire, Staffordshire and Northamptonshire. It was at that time a dark red and grisly animal that was able to thrive on pasture during the summer and beachnuts and acorns, found in the forests, during the fall and early winter. The original stock was long in the limb, long and thin in the snout and head, and flat in the rib. The pigs were active, hardy, good grazers and very prolific, but were slow in maturing. Being rather spare in body they carried very little fat, and when fatted and slaughtered they are said to have produced a large proportion of flesh.

In later times, after the country had become inclosed and land began to be brought under cultivation, a quieter pig, with a greater disposition to fatten was desired. In the effort to produce such an animal crosses of pigs having a strong infusion of Neapolitan blood were introduced. It is also said that a few breeders used a white pig that had been improved by Bakewell. The result of the mixture was a black, white and sandy pig. In the hands of breeders in certain districts of Staffordshire, all but the red or sandy colours were bred out, and pains were taken by selection to increase the feeding qualities of their pigs, and by the middle of the last century a very desirable class of pig had been evolved. It is claimed on good authority that a sow of the Tamworth breed won first prize at the Northampton show in 1847 in a class which included Berkshire, Essex and other improved breeds.

Fortunately the class of men who had undertaken the improvement of some of the other breeds, by sacrificing almost everything to an aptitude to fatten, did not undertake the Tamworth; hence the preservation of the length and prolificacy of the breed. Improvement was accomplished by reducing the length of limb, increasing the depth of body, and improving the feeding qualities of the animals.

For a number of years previous of 1870 the breed received comparatively little attention outside its own home. About that time the bacon curers opened a campaign against the then fashionable, short, fat and heavy-shouldered pigs, which they found quite unsuitable for the production of streaked side meat for which the demand was constantly increasing. The Tamworth then came into prominence as an improver of some of the other breeds, in which capacity it was a decided success owing to its long-established habit of converting its food into lean meat. This breed at once assumed an important place among the best sorts in Britain. Tamworths were given a separate classification at the Royal and other British shows about 1885. In general outline they are long, smooth and fairly deep, having a moderately light fore-end and deep ham; their carriage is easy and active on strong, straight legs.

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The Tamworth belongs to the large breeds, reaching weights almost equal to the Yorksire. Mature boars in show condition should weigh from 650 to 700 lbs; and sows about 600 to 650 lbs. Sows and barrows that are wisely and well reared are ready for the packers at about seven months of age, weighing from 180 to 200 lbs.

The points of excellence for the Tamworth, as in the case of the improved Yorkshire, should conform as nearly as possible to the requirements of the bacon trade, without overlooking constitutional vigour and easy feeding qualities. The following scale has been prepared with a view of describing the ideal Tamworth of the present day. It is general inasmuch as it applies to the Tamworth breed irrespective of sex. When judging mature boars and breeding sows due allowance should be made for masculinity in the former and matronly conformation in the latter.

SCALE OF POINTS.

		Student's Score.
Colour—		
Red or bright chestnut on flesh-coloured skin, free from black spots	2	
Head and Neck—9 points—		
Snout, moderately fine, long and quite straight	1	
Face slightly dished, poll wide and prominent	1	
Eyes, good size, full and bright, and moderately wide apart	1	
Jowl, light and neat	3	
Neck, medium length, deep and rather light, with no tendency to arch on top	2	
Ear, rather long with fine fringe, carried rigid but inclined slightly forward	1	
Fore-Quarters—15 points.		
Shoulders, light and smooth, rounded from side to side over top and very compact, no wider than back	8	
Breast, good width and full; floor of chest well let down	5	
Fore-legs, set well apart, medium length and straight, pasterns upright, bone clean and moderately fine, feet compact without tendency to spread when walking	2	
Body—40 points—		
Back, medium width, rising slightly above the straight line and forming a slight arch from neck to tail	8	
Loin, strong and full, but not unduly arched, wide as rest of back	5	
Ribs, good length, well arched from back, falling straight, giving flat, deep side	4	
Side, deep, long, smooth and straight between shoulder and ham, a straight edge laid over shoulder point and ham should touch the side throughout	12	
Heart-girth, full but not flabby; there should be no tucked up appearance back of fore legs, nor slackness back of shoulder top	5	
Flank, full and low	1	
Underline, straight; the belly should be markedly trim and neat unless in case of brood sows	5	

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SCALE OF POINTS—*Continued.*

		Student's Score.
Hind-Quarters—14 points—		
Rump, same width as back, long and slightly rounded from a point above hips to tail and rounded from side to side over top	5	
Ham, full without flabbiness; thigh tapering towards hock, carrying flesh well down both inside and outside of bone	4	
Hind legs, medium length, hocks set well apart but not bowed outward; bone clean and moderately fine; pasterns strong and upright; feet compact without tendency to spread when walking	4	
Tail, set high, inclined to curl, medium length and strength, tasseled	1	
Quality—15 points.—		
Ear, rather thin, fringed, firm and of medium size (1) hair fine and abundant and free from bristles (2); skin smooth, showing no tendency to wrinkle (3) bone clean in legs, moderately fine in snout and head and showing no prominence on side and top of shoulder (4); flesh firm and smooth, with no flabbiness at jowl, fore flank, belly or ham (5)	15	
Style—5 points—		
Active in movement, walking without a swaying motion and standing well up on pasterns	5	
Perfection	100	

Objections.—Narrow or excessively broad or sagging back; too thin or too short, thick or arching neck; sagging belly unless in brood sows; small cramped chest; pronounced depression back of shoulder; heavy shoulder; prominent shields on boars; wrinkled skin; crooked or deformed legs or feet; short or turned up snout; black or very light or curly hair, or swirls; slouch or drooping ears.

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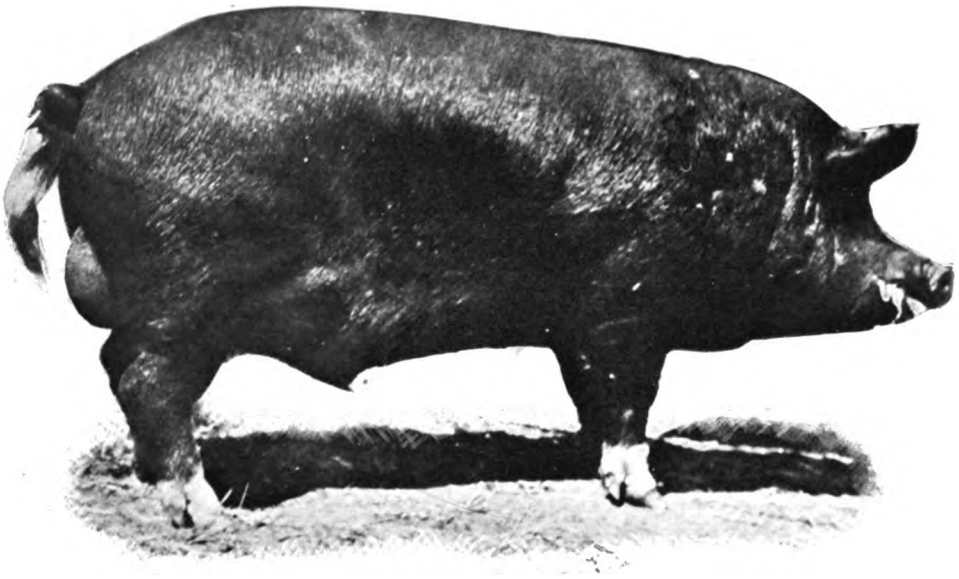
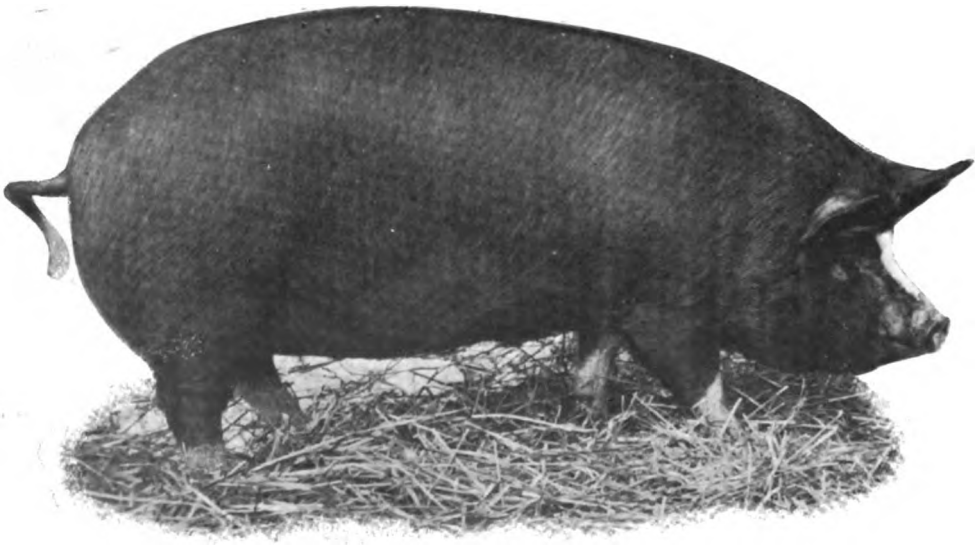


YEARLING BERKSHIRE BOAR.

WINNER OF FIRST PRIZE, CANADIAN NATIONAL EXPOSITION, 1906. THIS BOAR REPRESENTS THE MODERN BACON TYPE OF BERKSHIRE.



YEARLING BERKSHIRE SOW.

WINNER OF FIRST PRIZE, CANADIAN NATIONAL EXPOSITION, 1906. THIS SOW REPRESENTS THE MODERN BACON TYPE OF BERKSHIRE.

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THE BERKSHIRE.

The Berkshire is one of the oldest of the improved breeds of swine. More than a century ago it was bred in large numbers in and about the county of Berkshire, England, whence it obtained its name. At that time it was a large animal, somewhat coarse in body and having large pendent ears. In colour it varied from tawny to reddish brown, with black spots. Early in the nineteenth century the breed underwent considerable improvement, both in Berkshire and in the adjoining counties. It is claimed by historians that improvement was effected by the introduction of crosses of the finer Chinese and Neapolitan breeds and the perpetuation of the finer types found in English herds. About the year 1825 the breed had assumed a fairly uniform and desirable type, and the darker colours began to be quite general.

It was not until 1862 that the breed was given a separate class at the show of the Royal Agricultural Society of England. Soon after this, competition in the show ring became keen between the various improvers of the breed, each confining his exhibits to animals of his own breeding. The benefits derived from this were very marked, and it was not long before the breed reached a point of excellence that would be highly prized at the present time. They were of fine appearance and very hardy, of good size and length and yet without coarseness. The sows were prolific and the offspring vigorous. They matured early, producing a thick carcass of lean meat of fine quality by the time they were twelve months old. Up to this time the improvers of the breed were not so anxious about external markings as the commercial value of the animals; under these favourable conditions a very desirable class of hog was produced. The excellence of the breed became so marked that it attracted the attention of rich men, who soon became its fanciers and exhibitors and whose first thought too frequently was the production of prize winners of such a type and formation as pleased their whims. High prices were paid for certain extreme types, which naturally set breeders endeavouring to produce the kind that found favour. During this period the breed was undergoing an undesirable change, which was fostered still more by a keen demand for show animals from buyers in the United States. The main aim of these importers was to secure prize winning animals, or such as conformed to their fancy. The chief points aimed at were a short turned-up snout, heavy jowl, thick neck, wide shoulders and a fat back. The colour of the present day Berkshire was at that time fairly well established in the breed, although a white splash on the side and reddish marks about the body were not uncommon.

With the advent in the United States of the thick fat Poland-China, the demand for imported Berkshires dropped off very considerably and English breeders commenced to give attention to lengthening the form of their stock. Towards the end of the past century the breed had become considerably lengthened, and as a result we have the symmetrical, fairly long, fleshy type of Berkshire. While this breed retains its popularity in Canada in a marked degree, it can not as yet be said to have become entirely suited to the requirements of the packers. Numbers of breeders still adhere to the lard type, while many others are perpetuating only the longer and more fleshy

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representatives of their herds. For bacon production a cross between the Berkshire and the Yorkshire or Tamworth finds favour with both the producer and the packer. The Berkshire is an easy feeder, quite hardy and fairly prolific. It is not as large at maturity as the Yorkshire or the Tamworth, but it attains heavy weights when selected and reared with a view to size.

Mature boars in show conditions should weigh not less than 550 lbs., and mature sows in similar flesh not less than 450 lbs. The Berkshire requires about seven months of moderate feeding in order to be ready for the export bacon trade, weighing about 200 pounds.

In general outline the Berkshire is moderately long and deep; the body is symmetrical and proudly carried on strong, well-placed legs.

The points of excellence for the breed, from the standpoint of the Canadian breeder, should conform as nearly as possible to the standards set up for the Yorkshire and the Tamworth, having, however, due regard to form and markings characteristic of the breed.

When judging breeding stock due regard must be given to masculinity in boars and slightly more open conformation in sows than is called for in the scale of points.

SCALE OF POINTS.

		Student's Score.
Colour—		
Black, with white on feet, face and tip of tail, and an occasional small splash on the arm	2	
Head and Neck—9 points—		
Snout of medium strength and fine; face moderately dished	1	
Poll broad and prominent	1	
Eyes, good size, full, and bright	1	
Jowl, moderately full, firm and neat	3	
Neck, medium length and fulness, with no tendency to arch on top in the case of sows and barrows	2	
Ears generally almost erect, but sometimes inclined forward with advancing age	1	
Fore-Quarters—15 points—		
Shoulders, neat and smooth, rounded from side to side over top and very compact; no wider than back	9	
Breast, good width and full, chest full and low	4	
Fore-legs, set well apart, medium length and straight, pasterns upright, bone clean and moderately fine; feet compact without tendency to spread when walking	2	
Body—40 points—		
Back, medium width, rising slightly above the straight line and forming a very slight arch from neck to tail	9	
Loin, strong and full but not unduly arched; wide as rest of back	5	
Ribs, good length and well arched	3	

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SCALE OF POINTS—*Continued.*

Body—Continued.		Student's Score.
Side, deep, long, smooth and straight between shoulder and ham; a straight edge laid over shoulder point and ham should touch the side throughout	12	
Heart-girth, full but not flabby at fore flanks; there should be no tucked up appearance back of fore legs nor slackness back of shoulder top	5	
Flank, full and low	1	
Underline straight; the belly should be markedly trim and neat unless in case of brood sows	5	
Hind-Quarters—14 points—		
Rump same width as back, long and slightly rounded from a point above hips to tail, and rounded from side to side over top	5	
Ham full without flabbiness; thigh tapering towards hock, carrying flesh well down	4	
Hind legs medium length, hocks set well apart but not bowed outward; bone clean and moderately strong, pasterns strong and upright, feet compact without tendency to spread when walking	4	
Tail well set up on line with back, tapering, bearing white tassel	1	
Quality—15 points—		
Ear rather thin, firm and of medium size (1); hair fine, abundant and free from bristles (2); skin smooth, showing no tendency to wrinkle (3); bone clean in legs, moderately fine in snout and head, and showing no prominence on side and top of shoulder (4); flesh firm and smooth, with no flabbiness at jowl, fore flank, belly, or ham (5)	15	
Style—5 points—		
Active in movement, walking without a swaying motion and standing well up on pasterns	5	
Perfection	100	

Objections.—Narrow or excessively fat, broad or sagging back; too thin or too short, thick or aching neck; sagging belly unless in brood sows; small cramped chest; heavy shoulder; prominent shields on boars; pronounced depression back of shoulders; wrinkled skin; crooked or deformed feet or legs; very large and heavy or drooping ears; black points, or white or sandy spots on body, or swirls.

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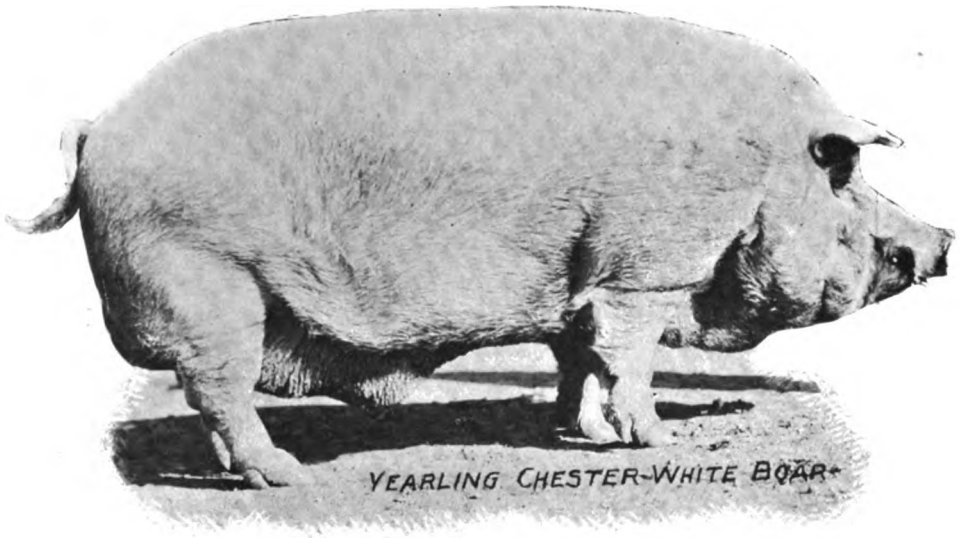
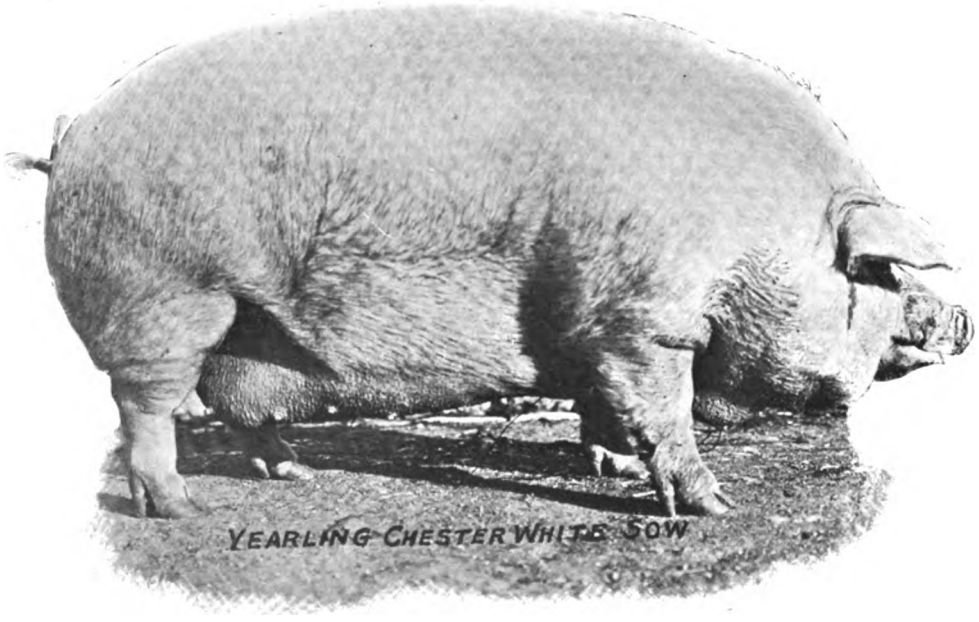


CHESTER WHITE BOAR.

WINNER OF FIRST PRIZE, PAN-AMERICAN EXPOSITION, BUFFALO, 1901.



CHESTER WHITE SOW.

WINNER OF FIRST PRIZE, PAN-AMERICAN EXPOSITION, BUFFALO, 1901.

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THE CHESTER WHITE.

The Chester White hog is a native of Chester county, Pennsylvania, where the breed originated early in the nineteenth century. It was a large, white, coarse animal, having coarse head, heavy, lopped ears, coarse hide, long heavy tail and coarse hair. An improvement of the breed was commenced by the introduction, on a farm near Brandywine Creek, in Chester county, of a pair of very fine white hogs imported from Bedfordshire, England, in the year 1816. Enterprising farmers of the districts commenced an improvement of their swine by the introduction of the prepotent blood of the imported stock. The produce of the first cross was so much superior to the original stock of the country that the new blood was eagerly sought by most of the leading farmers of the district. Encouraged by the improvement already secured, a system of careful selection and breeding was undertaken, with the chief object of securing a more suitable animal for the market. The improvement is said to have been continuous until the breed acquired an enviable reputation over a wide territory. The demand for breeding stock soon exhausted the available animals. This circumstance provided unscrupulous men an opportunity for doing the breed a serious injury. White pigs of all forms and descriptions were bought up and sent abroad as Chester Whites. The reaction was severe, as the breed received an unjustified condemnation. The demand for stock fell off seriously, and breeders of the genuine Chester White were able to again build up their herds. While the stock had undergone much improvement in quality, no attempt had been made to reduce the size. They were classed among the large breeds, and as such they reached the period when their breeders saw the wisdom of breeding to a standard, which they began to do about the beginning of the last quarter of the past century. Since that time improvement has been continuous. It has become one of the most popular breeds throughout the United States on account of its early maturing and easy feeding qualities. In a few cases Canadian breeders have sought, by selection and management, to develop the form and quality of animal looked upon with favour by the packers, and are now producing an animal intermediate between the bacon and lard types; but as bred in the United States, the Chester White is rather a 'Corn Belt' than a bacon animal. As a grazing hog it is claimed to excel most of the other breeds. It is moderately long, thick and deep and uniform in conformation.

Boars in show condition should reach 500 lbs. at two years of age; and sows of the same age and condition, 450 lbs. Pigs six months old in market form should weigh from 150 to 175 lbs.

The standard of excellence for the Chester White, adopted by the various United States Record Associations, calls for an animal having well arched neck, broad shoulders and back—qualifications very undesirable for bacon production. From the standpoint of the Canadian breeder, the standard should be modified to conform to the requirements of the bacon trade, as nearly as is consistent with the natural characteristics of the breed. When judging breeding animals by the following scale of points due allowance must be made for masculinity in males and openness of conformation in females.

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SCALE OF POINTS.

		Student's Score.
Colour—		
Hair white over pale pink skin	2	
Head and Neck—9 points—		
Snout, moderately fine, neat and tapering, face slightly dished	1	
Eyes, good size, full and bright, and fairly wide apart	1	
Jowl, full, neat and firm	3	
Neck, medium length and full, with only moderate tendency to arch on top	3	
Ears, medium size and thickness, soft, attached firmly to the head, pointing forward and slightly outward. and drooping	1	
Fore-Quarters—15 points—		
Shoulders, full, smooth, rounded from side to side over top and very compact, no wider than back	9	
Breast, good width and full; chest full and low	4	
Fore-legs set well apart, medium length and straight, pasterns upright, bone clean and moderately fine, feet compact and without tendency to spread when walking	2	
Body—40 points—		
Back, medium width, rising slightly above the straight line and forming a very slight arch from neck to tail	9	
Loin, strong and full, but not unduly arched; wide as rest of back	5	
Ribs, good length and well arched	3	
Side, deep, long, smooth and flat between shoulder and ham	12	
Heart-girth, full but without flabbiness at fore-flanks; there should be no tucked up appearance back of fore legs nor slackness back of shoulder top	5	
Flank, full and low	1	
Under line straight; the belly should be moderately trim and neat unless in case of brood sows	5	
Hind-Quarters—14 points—		
Rump, same width as back, long and slightly rounded from a point above hips to tail, and rounded from side to side over top	5	
Ham, full without flabbiness, thigh tapering towards hock, carrying flesh well down both inside and outside of bone	4	
Hind legs, medium length, hocks set well apart, but not bowed outward; bone clean and moderately fine, pasterns strong and upright; feet firm and compact without tendency to spread when walking	4	
Tail, small, smooth, tapering, well set on, not too high or low, curled	1	

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SCALE OF POINTS—*Continued.*

		Student's Score.
***Quality*—15 points.**		
Ear rather thin, firm and of medium size (1); hair fine and abundant (2); skin smooth, showing no tendency to wrinkle (3); bone well defined and clean in legs, moderately fine in snout and head, and showing no prominence on side and top of shoulder (4); flesh firm and smooth with no flabbiness at jowl, foreflank, belly or ham (5)	15	
***Style*—5 points—**		
Active in movement, walking without a swaying motion and standing well up on pasterns	5	
Perfection	100	

Objections.—Narrow or sagging back; too thin or too long neck; sagging belly unless in brood sows; small, cramped chest; pronounced depression back of shoulder; rough shoulder; prominent shield on boars; wrinkled skin; crooked or deformed legs or feet; black hairs, black spots, curly coat or swirls; very short snout; very large ears lying close to face or small stiff ears carried erect.

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HERD OF POLAND CHINAS.
PRIZE WINNING PEN, PAN-AMERICAN EXPOSITION, BUFFALO, 1901.

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THE POLAND-CHINA.

The Poland-China hog originated in the Miami valley, chiefly in the counties of Warren and Butler, in the state of Ohio. The conditions were favourable to swine growing, and the city of Cincinnati became, prior to the middle of the past century, one of the greatest pork packing centres in the world. Hog raising was at that time the most profitable feature of farming in the surrounding country. Since there were no railroads at that time fatted hogs had to travel on foot to market, so that activity of the animals was as important as easy feeding qualities. The hogs of the district were known by a variety of names, and were extremely cosmopolitan in their make-up. The foundation stock consisted of the native unimproved hog. Many settlers from Great Britain and other European countries brought hogs of varieties common in the districts whence they came, and in this way a constant change in the stock of the country was affected. With the improvement of roads and the introduction of railways, the activity of the animals became a secondary matter and they rapidly became thicker and shorter in the leg.

While hogs of various types were introduced into the Miami valley, the breeds that did most in improving the stock were the Berkshire, the Russian, the Big China, the Byfield, and the Irish Grazier. From about 1820 to 1840 the main crosses, instrumental in the formation of what later became the Poland-China breed, were introduced. The Berkshire gave the black colour and improved symmetry, the Big China improved the fattening qualities, while the other crosses gave size and strength. According to authoritative writers, no outcrosses have been introduced since 1845.

Owing to the seemingly discordant elements of which it was made up, and the lack of a standard, the breed, then known as 'The Warren County Hog,' underwent many changes in conformation and colour prior to 1870. Up to this time the growing and fattening qualities of the animals were considered of much greater importance than colour or particular form. Having secured the desired qualities of fattening, leading breeders, about the date mentioned, decided, in a general way, upon the form and colour most desirable and upon the name Poland-China. Within a few years a number of organizations had been formed in the interests of the breed, and most of these adopted about the same standard of excellence. Attention was given to hastening maturity and to improving the quality and fattening powers, until we now have in the Poland-China one of the most economical meat-making hogs of the great 'Corn Belt' of the United States. Neither its form nor its carcass is in accordance with the requirements of the bacon trade; hence the breed is not looked upon with favour by those closely associated with the development of the Canadian bacon industry.

In general appearance the Poland-China is compact, symmetrical, full and round, smooth and inclined to massiveness in build. The characteristic colour is black, with white on face or lower jaw, white on feet and tip of tail; a few small clear white spots on body are not objectionable. Boars two years old and over in good condition should weigh not less than 500 pounds, and sows of same age and condition not less than 400 pounds. With these points and the illustration of the group of Poland-Chinas shown on the opposite page a fairly accurate idea of the typical hog of this breed may be obtained.

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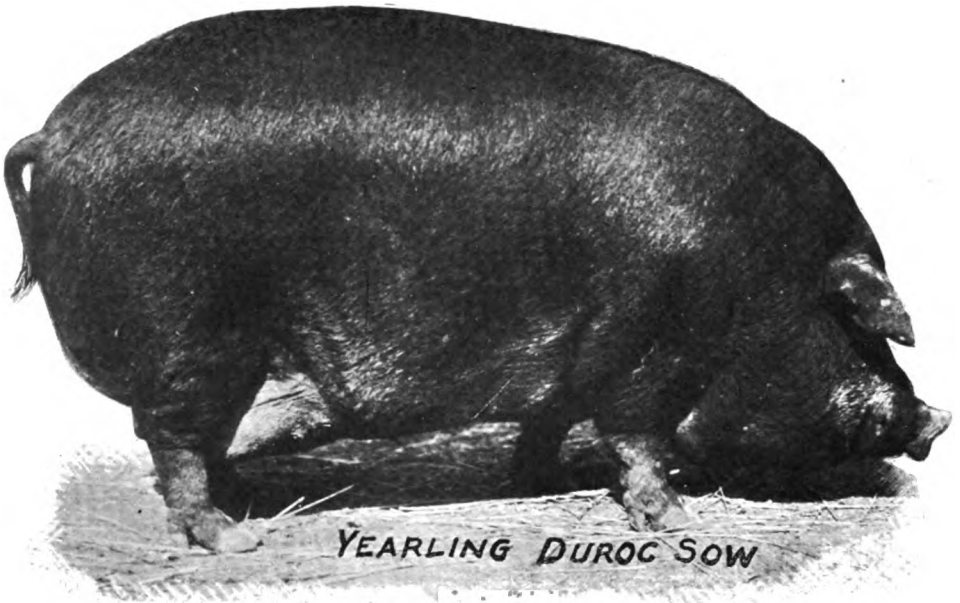

DUROC JERSEY SOW.
WINNER OF FIRST PRIZE, PAN AMERICAN EXPOSITION, BUFFALO, 1901.

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THE DUROC-JERSEY.

The Duroc-Jersey hog, according to the most authentic historians of the breed, is the outcome of a union of the two classes of red swine known respectively as the Durocs and the Jersey Reds. The latter have been known to exist in a condition of greater or less purity in New Jersey and other Atlantic states for upwards of 70 years, while the former was for a long time the leading hog raised in Saratoga county, New York. The Jersey Reds were large in size, rather fine in quality, and of fair length and thickness. It is believed that the Jersey Red is descended from the earliest importations of the Berkshires, which in their early days were of a variety of colours, including buff, sandy and reddish brown, spotted with black. It is considered probable that the Durocs were descended from the same parent stock, but of this there is less certainty. The two varieties were for many years kept amid different environments which would account for the lack of similarity between them when they were united, at a date prior to 1850, to form the Duroc-Jersey breed.

The breed, from its early days, has been noted for docility, prolificacy and hardihood, qualities which have been well maintained. Size and weight were aimed at by improvers through many generations, and some 25 years ago the average of the breed was larger than at the present day. In 1877 breeders in Saratoga and Washington counties, New York, agreed upon a standard of characteristics that has been varied but little by more recently formed record associations. During the past two decades the breed has been improved in quality, easy feeding and early maturing propensities, and is now held in about equal favour with the Poland-China and the Chester White in the leading pork producing areas of the United States.

The Duroc-Jersey has a few admirers in Canada, but its thick, fat form, as seen in the leading herds of the United States, is so unsuited to the requirements of the bacon trade that its popularity has not extended to any extent north of the international boundary.

The Duroc-Jerseys, with their moderately long, straight heads, drooping ears, and smooth, neat bodies, bear a rather close resemblance to the Poland-Chinas in form, but they are somewhat stronger in limb. Boars two years old in good condition should weigh not less than 600 pounds, and sows of similar age and condition 500 pounds. Their colour is cherry red without other admixture. The accompanying illustration represents the form that is highly prized by fanciers of the Duroc-Jersey breed.

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SHEEP HUSBANDRY IN CANADA

AGRICULTURE
UNIVERSITY
OF
CALIFORNIA

Published by
authority of the
Hon. SYDNEY A. FISHER
Minister of Agriculture
Ottawa, Ont.

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DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

BRANCH OF THE LIVE STOCK COMMISSIONER

SHEEP HUSBANDRY

IN

CANADA

BY J. B. SPENCER, B.S.A.

BULLETIN No. 12

Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.

MAY, 1908

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OTTAWA, May 1, 1908.

To the Honourable,
The Minister of Agriculture.

SIR,—I have the honour to present the accompanying treatise, prepared by Mr. J. B. Spencer, B.S.A., of this Branch, with the object of encouraging a revival of the sheep industry, which, for some time back, has not been progressing as rapidly as might be wished, especially in view of the fact that many districts in Canada are eminently suitable for the profitable pursuit of this branch of animal husbandry. It will also be most useful as a means of supplying information regarding the breeding and care of sheep, a subject on which enquiries are being constantly received from all parts of the Dominion.

I herewith transmit the copy with a recommendation that it be published and printed for distribution as Bulletin No. 12 entitled 'Sheep Husbandry in Canada.'

I have the honour to be, sir,
Your obedient servant,

J. G. RUTHERFORD,
Live Stock Commissioner.

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ACKNOWLEDGMENTS

For valuable assistance rendered the Live Stock Branch toward the preparation of this bulletin grateful acknowledgments are due to the following authorities: W. A. Hamilton, Lethbridge, Alberta; J. A. McCaig, Edmonton, Alberta; John McQueen, Brandon, Manitoba; A. W. Smith, Maple Lodge, Ontario; the several provincial Departments of Agriculture; sheep buyers, and abattoir companies; wool dealers and woollen manufacturers, besides a large number of sheep raisers throughout the Dominion. Grateful acknowledgments are also due the 'Farmers' Advocate,' the 'Scottish Farmer' and the 'American Sheep Breeder' for the use of photographs of certain breeds illustrated in this bulletin.

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Fig. 1—Resting at Midday.

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INTRODUCTION.

The sheep industry of Canada dates back almost to the beginning of her agriculture. The first settlers as early as possible established little flocks of sheep to supply both food and clothing for their families. Even when the bears and wolves were plentiful sheep were kept by a much larger proportion of the farmers than at the present time.

There is probably no country in the world better adapted than Canada to sheep raising, and no country offers greater opportunities for the development of the industry. The physical features, the soil, the climate and the agricultural population are all favourable to the production of mutton and wool of the highest quality.

Canada is as favourable for the raising of vigorous sheep as healthy cattle, horses and hogs, yet we find each of these latter classes of the live stock industry have been forging ahead, while the first named has been falling back in almost every province of confederation. From 1881 to 1901 the numbers of horses, cattle and swine in all Canada increased from about 30 to about 50 per cent, while during the same period the sheep decreased about 17 per cent. In 1881 the total sheep population of Canada is given as 3,048,678, and in 1901, the year the latest Dominion census was taken, 2,510,239. With the exception of the provinces of Alberta and Saskatchewan, until recently known as the Northwest Territories, the falling off has been fairly uniform over the Dominion.

Various reasons are advanced for the falling off of sheep keeping. The Canadian farmer is credited with a lack of steadfastness in his business, and in this he does not differ from the farmers in many other countries. This tendency on the part of the Canadian stock grower no doubt goes a long way to explain the reduction in sheep. Mutton and wool prices fell, and sheep keeping conducted in the old haphazard way on many farms, brought very little revenue. The thorough-going sheepman did not find it necessary to abandon sheep keeping, and these men have reaped the reward of good prices and incidently cleaner and richer farms. It is true the pestiferous dog discouraged many sheep keepers, especially near centres of population, while the substitution of the barbed wire for the old rail fence drove many out of the business.

There are other reasons why sheep keeping has not kept pace with other branches of the live stock industry that have in their turn had ups and downs. The very fact that sheep are so easily kept has caused a lack of interest in them. No end of effort has been made to assist the hog industry and the keeping of cattle, but the sheep are so easily kept and so harmless they have been allowed to drift with the current of indifference. The very obstinacy of the hog and the narrow margin of profit possible under average treatment have played their part in stimulating the swine raiser in his work. The never-ending labour incident to dairying has helped the cow, while the risks and slow returns in horse breeding have borne fruit for the betterment of the equine industry. The sheep that is able to return two crops in a year under semi-neglect and poor housing has not called for a fight for its perpetuation and has suffered in consequence.

Again it would appear that the sheep industry thrives best under two widely different conditions. In the days of primitive agriculture the system of home economics rendered the sheep to furnish clothing as necessary as the cow to yield milk. Practically every farm in the early days had its little flock of sheep, which was given better treatment than many flocks receive at the present time. As the necessity for home-grown clothing passed away only those farmers possessing the shepherding instinct or the keen commercial spirit retained their flocks. The other extreme favourable to sheep raising exists in the most advanced agriculture, such as is found in

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Great Britain at the present time. There the rents, taxes and other expenses render it necessary that every foot of land yield the maximum of revenue. Under these conditions the value of the sheep as an aid to agriculture is recognized and sheep keeping holds its place with the raising of beef, pork and other live stock products. Canadian agriculture in many districts occupies the intermediate position, and unless in the most progressive sections the keeping of sheep is conducted in a half-hearted manner. As it emerges into the more definite, highly organized business, calling forth the exercise of the skilled stockmen it will grow into a leading branch of agriculture in Canada, as it has done in Great Britain.

It is exemplified by the excellence of flocks in all parts of Canada that each and every province is adapted to sheep breeding. It is also proven by the excellence of flock masters that the industry may be profitably conducted in all parts of the Dominion. This is true on high priced arable land where the cow, the hog, and the wheat field flourish abundantly. It is not, however, under these circumstances that the industry has its brightest outlook or room for expansion. It is the rugged pasture land not easily tilled that awaits the shepherd. In most of the provinces there are thousands upon thousands of acres of rugged country that are at present yielding practically nothing. If stocked with sheep in large bands or small flocks many of these districts could be made to yield handsome returns.

Owing to the improved market for both wool and mutton there has been in many quarters during the past two years a growing tendency to stock up and improve the flocks, and it is probable that the next Dominion census report will show an improved state of affairs.

The sheep breeding industry is looked after in a more or less definite way throughout Canada by live stock and sheep breeders' organizations. Provincial sheep breeders' associations have been organized in Quebec and Alberta. In Manitoba one association looks after sheep and swine, while in Saskatchewan and British Columbia this branch of live stock is supervised by general live stock associations. Other organizations of western sheep breeders are the Alberta Wool Growers' Association, with headquarters at Lethbridge, and the Vancouver Island Flock Masters' Association. In the Maritime Provinces the one association for all classes of stock has some slight supervision over the sheep industry of the three provinces. The industry in the Province of Ontario has for many years had the supervision of the Dominion Sheep Breeders' Association. While Dominion in name this organization has until recently been little more than an Ontario sheep breeders' association. In 1906, however, this body secured Dominion incorporation under the Pedigree Act, which gives it a standing over the entire Dominion. It is under this organization that sheep registration is carried on under the National Record System.

The breeds for which records have been established are as follows:—Lincoln, Cotswold, Leicester, Oxford, Shropshire, Southdown, Hampshire and Dorset. Records for Cheviots, Black-face and Suffolk breeds are in process of organization. Information with regard to the rules of entry and other matters pertaining to registration may be secured from the Accountant, National Live Stock Records, Ottawa.

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THE MUTTON SHEEP.

The production of mutton has become very largely a question of furnishing lambs to the market. As in beef and pork, the demands of the market call for young meat and comparatively light weights of carcasses. The premium paid for baby beef and bacon hogs applies with even greater force to sheep. Thick, fleshy, but rather light joints are what the cook calls for whether for the home table or the restaurant. The tastes of the consumer have been cultivated to discriminate in favour of the tasty, tender lamb until we find that from 70 to 80 per cent of the sheep that reach the market are less than one year old. The age of heavy mutton appears to have passed—a condition most favourable to the sheep raiser, who is thus enabled to reap quick returns from his flock. In the very nature of things there will always be mature sheep sold as mutton as the breeding stock must, sooner or later, reach the block. The increasing demand for lamb mutton augurs well for the future of the industry, provided care is taken to keep up and improve the grade of the product. What is needed is careful attention to not only the production of the rapidly growing lamb, but that it possesses the qualities called for by the high-class trade. A prime lamb is in demand and will always command a high price, while the skinny, lank, bare-backed sheep is not wanted at all. The market wants flesh in any case, and when it comes from the back, the loin or the leg so much the more is it prized.

The raising of lambs for the market requires first of all a strong uniform flock of ewes that are active foragers, uniform and regular breeders, and copious milkers. It is also important to pay some attention to the shearing qualities of any flock of sheep.

As with other classes of stock, the matrons of the flock must be vigorous in order to produce lambs that will take hold of life courageously. In addition a ewe requires a strong maternal nature which is shown in prompt and ready care of the newly born offspring and a copious supply of milk. Such ewes are deep and wide in the chest, fairly compact but with sufficient length to give considerable size to their middles. Their heads should be pronounced in breadth between the ears, they should have large, mild, wide open eyes and well expanded nostrils. They should be free from coarseness, as also over refinement which suggests delicacy of constitution. These are the characteristics which the breeder needs to look for in order to get thrifty, well-doing offspring, but the other side of the question—that of the market—has also to receive attention.

Viewed from Market Standpoint.

To form a basis for estimating the good and bad qualities of sheep, it is best to consider the carcass and that from the point of view of the butcher. The different parts of the lamb show a wide variation from the butcher's standpoint. The most valuable meat is found over the back, loin and hind-quarters. The butcher, therefore, requires a broad back, a broad full loin and a heavily fleshed leg of mutton. The shoulder is not so valuable as the cuts farther back. The neck is a cheap part and is valuable according to thickness, but since it sells for little it is not important to breed for neck development. On the other hand, a thin neck is to be avoided, because such indicates weakness of constitution, and a thin neck usually goes with a slenderness of body. The neck, therefore, should be short and thick, which condition is likely to characterize the entire carcass. The carcass is usually divided by the butcher between the second and third ribs. The front part is worth about two cents per pound less than the hind part. It, therefore, follows that from the market standpoint the development of the back, loin and hind-quarter must be kept in mind. In all the parts smoothness of conformation is important. Roughness or angularity invariably go with

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bareness of back and an excess of bone in the carcass. A rough sheep is usually very open at the top of the shoulder, showing a pronounced depression between the shoulder blades. This part for six or seven inches should be flat and well covered with flesh in a fatted sheep. The ribs should show good spring and be well covered with firm flesh. The back bone should not stand prominent at any point in a sheep even in only moderate flesh. A groove over the spinal column frequently seen in well fleshed sheep is not objectionable, although flatness and smoothness are rather to be preferred. While a full, fleshy loin is most desirable a high arching loin is not the formation to be looked for and perpetuated. The level smoothness recommended for the shoulder and back over the ribs, should characterize the loin. A high loin is inclined to be bare rather than fleshy, or the loin may appear high in comparison with a low, sagging back which is always to be condemned as bad formation. The loin should have width and thickness in order to yield a good quantity of flesh. Among the common flocks of the country drooping rumps are frequently seen. This is most undesirable whether the falling away is towards the tail head or down the thigh. The hind-quarter should continue straight and full both on the top and side lines. From the hip to the hock a sheep in good flesh should be especially strong. Not only should the 'leg of mutton' be plump and full with muscle on the outside, but between the legs, in the twish, the flesh should fill well down to the hock, compelling the hind legs to stand well apart. When grasping the leg of mutton on the inside a decided plumpness should be found in a mutton sheep.

The Feeder's Side.

From the market standpoint the chest, breast or underline require little consideration, but from the side of the feeder or breeder these parts are of great importance. A sheep to be profitable to the feeder must have vigorous constitution and be able to consume a large amount of food and transform it into valuable meat at the lowest possible cost. These characteristics are invariably associated with a wide, deep chest, good depth of barrel, and well sprung ribs to give ample room for the lungs, heart and digestive organs. The wise feeder or breeder will also look for good size, because he wants an animal that will attain a good weight at an early age. A short, broad head, full, bright eyes, an open nostril, strong lips and a short, thick neck, deep body and short legs all go to indicate a vigorous, thrifty animal which will give a good return for food consumed and kill out a valuable carcass of mutton.

The breeder who wishes to establish a pure-bred flock, besides requiring all these marks of excellence which the butcher and feeder require, needs to pay much attention to the character of the fleece, the colour and covering of the head and legs, the colour of the skin, and correctness of the breed type.

Scale of Points for Mutton Sheep.

A. General appearance, 24 points.	
Estimated weight, lbs.	
Score according to age and breed..	4 points.
Form—long, deep, broad, low set, and uniformily smooth; top line, from neck to turn of rump, and underline from point of brisket to hind flank, straight and parallel..	8 "
Quality—bone fine and clean-cut; hair on face, ears and legs soft; skin, fine and mellow; all fleshy parts well developed, showing even covering of firm flesh.. ..	8 "
Style—active, alert, vigorous but not restless, exhibiting aristocratic bearing..	4 "

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B. Head and neck, 9 points.

Muzzle—well defined; mouth large and strong; lips, strong without coarseness; nostrils large	1 points.
Eyes—large, prominent, clean and placid	1 "
Face—rather short than long, features clear-cut and attractive	1 "
Forehead—broad and prominent	1 "
Ears—fine in texture, medium size for the breed, carried with lively back and forth movement	1 "
Neck—short, thick, round with full neck vein, free from folds at throat, carrying the head well erect; stronger and more arched in rams than in ewes	4 "

C. Forequarters, 6 points.

Shoulders—large, plump and smooth; wide above rounded out from above, forward and below to the centre, well filled before and behind, uniting with neck and back imperceptibly	4 "
Legs—arm broad and well muscled; leg straight, short, wide apart and yet well placed under the body, standing firmly on hoofs of good shape and quality	2 "

D. Body, 30 points.

Chest—deep and full, indicating abundance of heart and lung capacity; breast full; brisket prominent and broad; heartgirth, large	9 "
Back—level, wide, well covered with firm flesh, with spinal column hidden and even depressed from the loin to the tail head	9 "
Ribs—well sprung from backbone, nicely arched and well covered with flesh	4 "
Loin—broad, full and thick	6 "
Flank—well developed in thickness and even with side and underline	2 "

E. Hindquarters, 16 points.

Hips—far apart, level, smooth, well covered with flesh	2 "
Rump—long, broad, carrying width and topline well back to tail, deeply and evenly fleshed	4 "
Thighs—broad, and well filled, carrying plumpness well down to underline of body	3 "
Twist—full and deep, nearly as low as flank	3 "
Legs—short, straight and strong, wide apart, yet well under the body, standing firmly on hoofs of good shape and quality; pasterns, strong and only slightly sloping	2 "
Skin, a rich pink in colour and possessed of mellow handling qualities	2 "

F. Wool, 15 points.

Quantity—long for the breed, dense and even	6 "
Quality—fine for the breed, pure, crimp regular and uniform	5 "
Condition—bright, sound, clean, soft and lustrous	4 "

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Points of the Sheep.

1. Muzzle.
2. Mouth.
3. Nostril.
4. Lips.
5. Nose.
6. Face.
7. Forehead.
8. Eye.
9. Ear.
10. Neck.
11. Neck vein or shoulder vein.
12. Top of shoulder.
13. Shoulder.
14. Arm.
15. Shanks.
16. Brisket or breast.

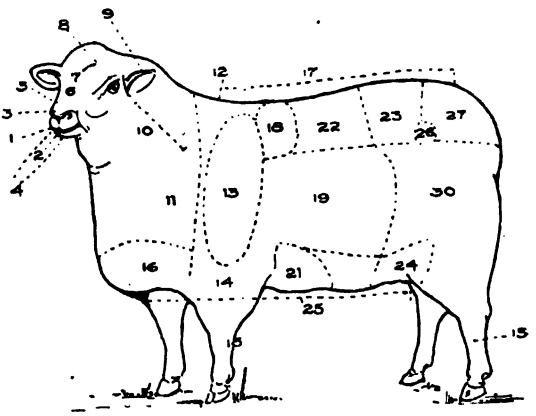

Fig. 2.—Points of the Sheep (side and front view).

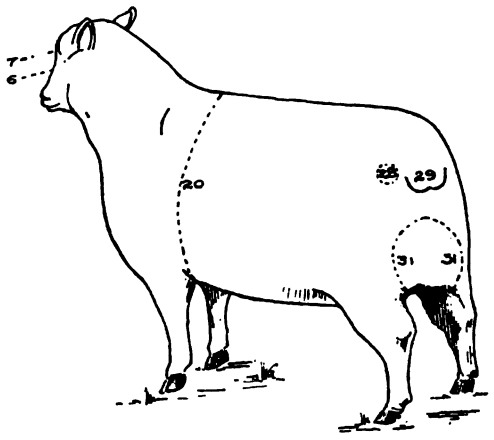

Fig. 3.—Points of the Sheep (rear view).

17. Top line.
18. Crops.
19. Ribs.
20. Girth, or heart girth.
21. Fore flank.
22. Back.
23. Loin.
24. Hind flank.
25. Underline.
26. Hip.
27. Rump.
28. Pin bones.
29. Dock or tail.
30. Thigh, or leg of mutton.
31. Twist.

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LEADING BREEDS OF SHEEP.

THEIR ORIGIN, DEVELOPMENT AND CHARACTERISTICS.

There are a great number of varieties of domestic sheep, all of which are doubtless descended from one wild form. Domestication of this class of animals commenced almost at the beginning of the human race, when the second son of Adam chose sheep herding as an employment. With the migration of the human family sheep were taken to different parts of the world and under the varying environments in which they were perpetuated they assumed characteristics and properties quite different from one another. With improvement in agricultural practice sheep as well as other farm animals were kept and developed along special lines. This going on simultaneously in different portions of Europe and Asia it was but natural that varieties of quite different characteristics would be evolved. The probability is that domesticated sheep originated through the domestication of several races in many parts of the world, the peculiarities and valuable properties of each having been developed by selection, until a more or less perfect type was obtained. The crossing of species of sheep originally distinct has no doubt still further increased the number of our recognized breeds.

The leading breeds of sheep found in Canada, with the exception of the Merino, which is kept to some extent only in the northwestern provinces, have been developed in Great Britain. They are classified as long and medium woolled, the Merino in its various forms being classed as fine-woolled.

Throughout the British Isles there is found in a state of greater or less purity more than a score of breeds, the chief of which are as follows: Black-Face, Herdwick, Gray, Lonk, Devon, Longwool, Exmoor, Welsh, Cheviot, Suffolk, Leicester, Lincoln, Cotswold, Oxford, Shropshire, Hampshire, Southdown and Dorset. Of these only the last eight breeds named are at all common in Canada. A small number of Black-Faces, Suffolks and Cheviots are also to be found, but neither of these is increasing to any appreciable extent.

The Lincoln, the Leicester and the Cotswold are known as the long-wool sorts, while the Oxford, the Shropshire, the Dorset, the Hampshire and the Southdown are classed as medium-woolled, the fleece shortening in length in the order named. The fleece of the Cheviot and also of the Suffolk is medium in length, but the former is the longer of the two. These two sorts are, therefore, placed with the medium-woolled varieties.

The Leicester.

The Leicester is the oldest of the long-woolled races of sheep. It appears to have inhabited Leicestershire, England, and the adjoining counties even prior to 1660, when the districts referred to were noted for the excellent quality of their sheep, which are said to have possessed large bone, rangey frames and heavy fleeces of strong texture. They were slow to mature and to fatten. It is generally believed by authorities that the sheep found in these counties, known as the Midlands, were used by Robert Bakewell, of Dishley, as the foundation of the New Leicester or Dishley breed.

Mr. Bakewell commenced an improvement of the sheep of his district in or about 1755. The merit of his work consisted in his realization of the fact that the properties

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of parents may be transmitted to their offspring until fixity of type is the result; also in his innate power of discerning by an animal's external form and 'quality' that it possessed the properties he desired to perpetuate. He was able to discriminate between size and quality and had always an eye for the latter when selecting breeding animals. In order to render permanent the desired qualities of the selected stock he resorted to in-and-in breeding to an almost incestuous degree. The qualities sought by Bakewell were greater symmetry of form, improved qualities of fattening, and an earlier maturity, a reduction in the proportion of bone and of fat, and a greater development of the parts of the carcass of most value on the block. These characteristics were undoubtedly secured, but others of great importance were to some extent overlooked; these were strength of constitution, prolificacy, as well as quantity and quality of fleece. The breeders of Leicesters in later years have overcome these defects.

It is recognized that no other breed possesses a greater expansion of heart girth than the Leicester. Nor is prolificacy lacking in the present day Leicester, as triplets are of frequent occurrence, and from 150 to 175 per cent of increase is not uncommon in well kept flocks. Whatever weaknesses marked the fleeces of Leicesters in Bakewell's time these have long since been overcome in well kept flocks. As a rule good specimens are thoroughly covered in all parts except head and legs; length and density are also present in a high degree, while the wool of no other breed excels in lustre.

In order to extend the blood of the improved stock as rapidly as possible, Mr. Bakewell instituted a system of hiring rams of his flock for the breeding season to farmers in the district. During the first year or two farmers were slow to take advantage of the use of the improved sheep, and all Mr. Bakewell could get for the season's use of rams was some 17 shillings and 6 pence each, but the improvement effected by these crosses was so evident that in a few years the demand for the sheep became so keen that the price rose to one hundred guineas per head, and in a single season, 1789, it is said that six thousand guineas were obtained for the services of Bakewell rams.

The Leicester sheep as it came from the hands of Mr. Bakewell, near the end of the eighteenth century, is described as a white-faced, hornless race of excellent mutton sheep, with short thick neck, wide level back, thick deep chest, deep quarters and fine bone and bearing a fleece measuring about seven or eight inches in length of somewhat lashy wool, but terminating with a short twisted curl.

About the time of Bakewell's death, one George Culley commenced using Leicester rams from Dishley on the Teeswater breed, which was at that time in high favour as a long-woolled sheep. The stock evolved from this cross is believed to have been the foundation of the Border Leicester, although on account of the proximity of the home of the Cheviot it is not unreasonable to suppose that in the early years of the Leicester the blood of its white-faced neighbour entered into many of the best flocks. Border Leicester rams soon became as popular as Bakewell's had been, as much as one hundred guineas being paid for the use of a single animal for a season. From that time until the present the Border Leicester has stood in high favour as a mutton and wool producing breed. The Bakewell Leicester, later becoming known as the English Leicester, was perpetuated in its pure state and is to-day raised in large numbers in Great Britain and in other countries.

The difference between the English Leicester and the Border Leicester is seen in the head, which in the Border variety is white, and boldly carried, the nose slightly aquiline, the muzzle full, the nostrils wide and the ears erect. The head is clean and free from wool. The English Leicester usually carries a tuft of wool on the head and it is also woolled on the shanks. The English Leicester has a bluish-white face; whereas the Border Leicester's face is clear white. In carcass the Border Leicester is larger and longer and the belly is not quite so full in outline, being carried rather more highly.

No other race of sheep has been so largely employed as a means of improving other breeds as the Leicester; the Cotswold, the Lincoln, the Shropshire and the Hampshire and many others directly or indirectly have through its blood been improved.

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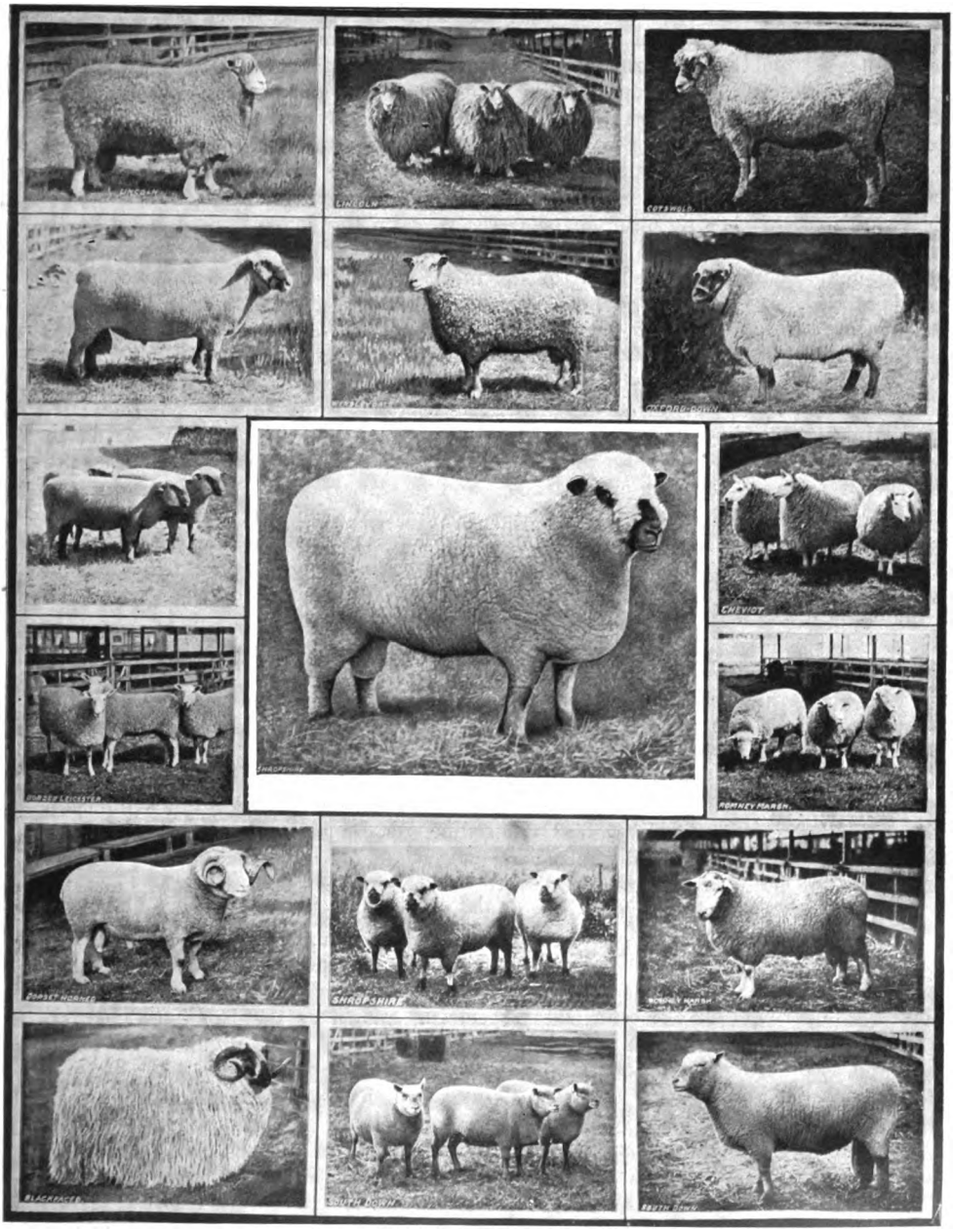

Fig. 4.—Representatives of British Breeds of Sheep.
(Reproduced from an English Live Stock Publication.)

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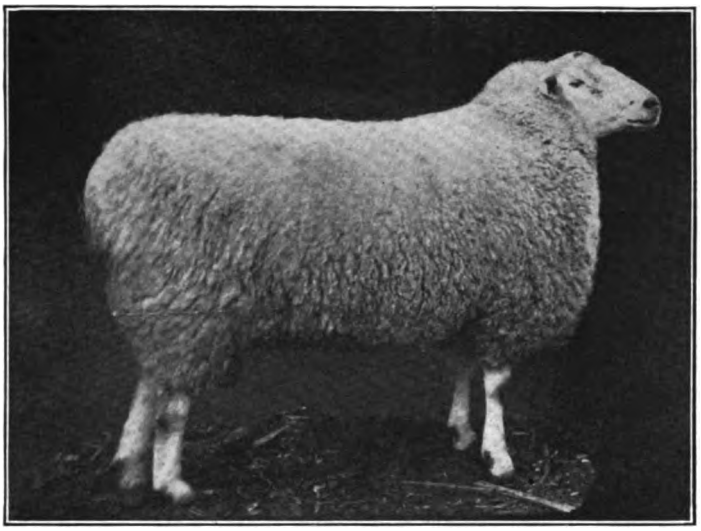

Fig. 5.—Leicester Ram.

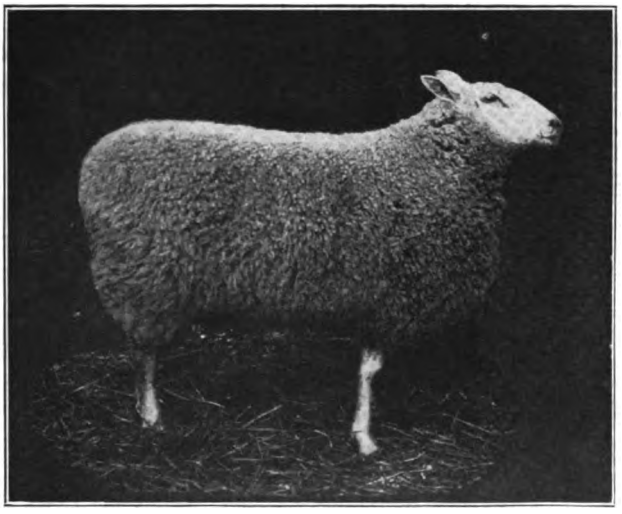

Fig. 6.—Leicester Ewe.

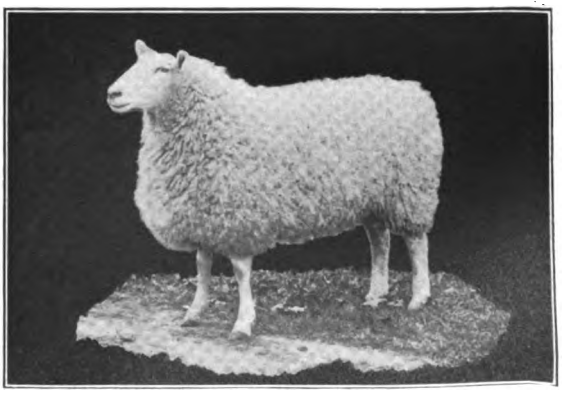

Fig. 7.—Leicester Ewe Lamb.

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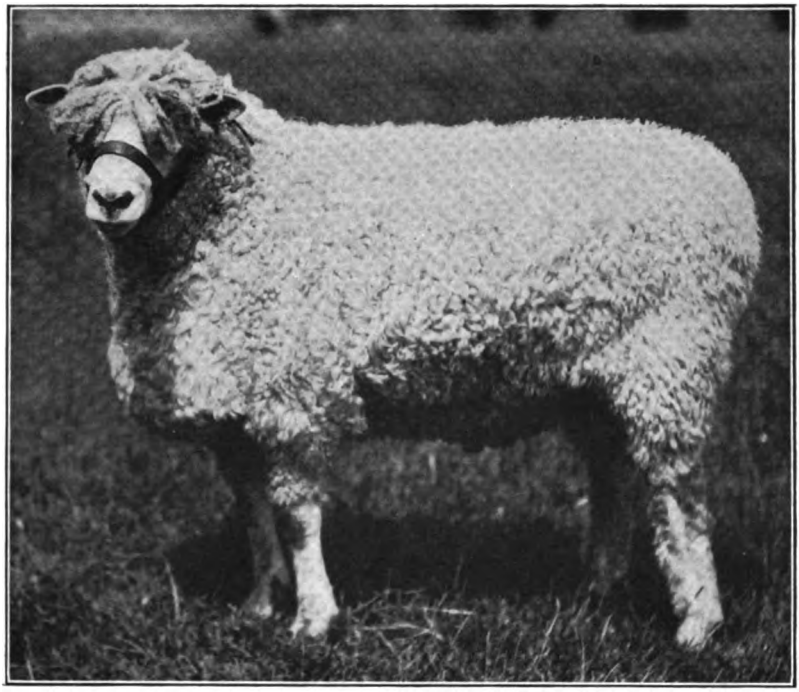

Fig. 8.—Cotswold Ram.

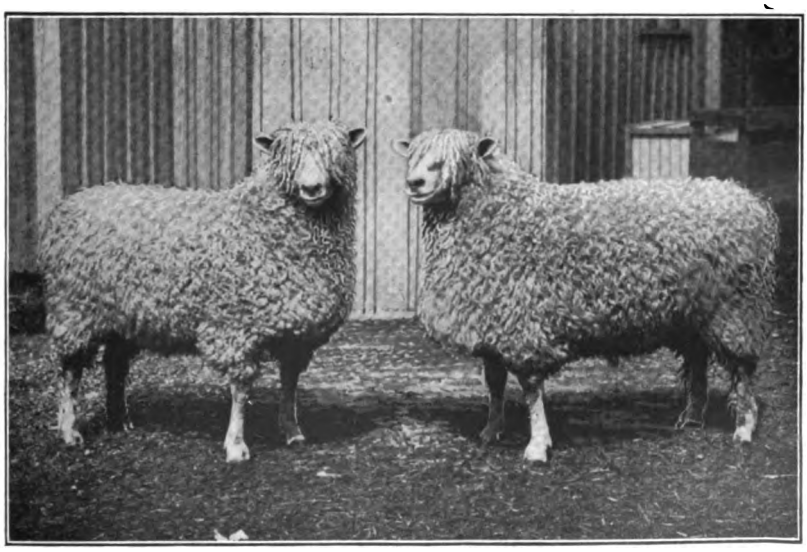

Fig. 9.—Pair of Cotswold Ewes.

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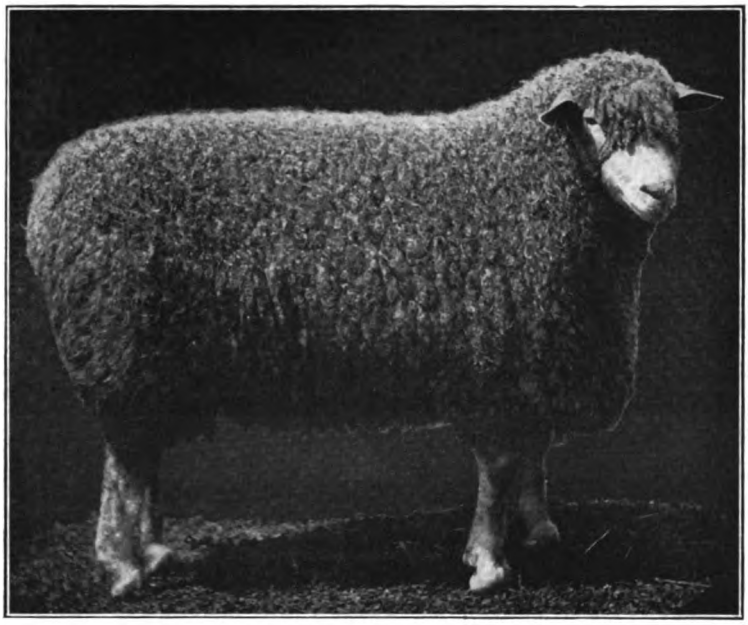

Fig. 10.—Lincoln Ram.

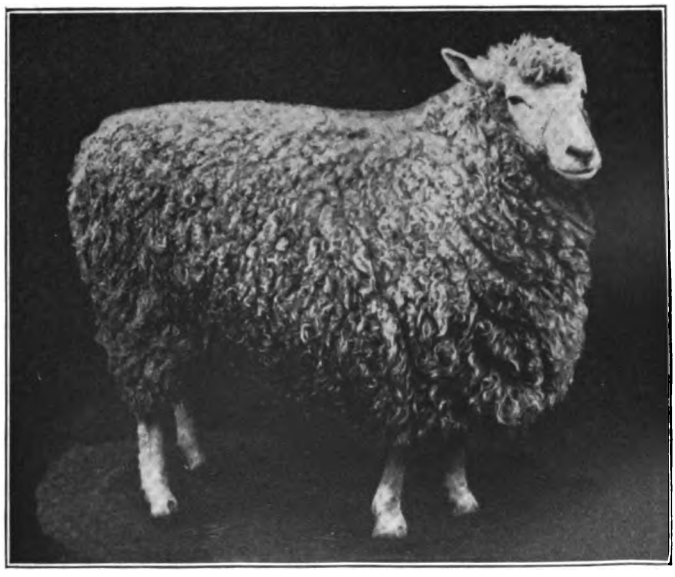

Fig. 11.—Lincoln Ewe.

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Canadian Leicesters are among the best of the Leicester family. Nowhere in the world are finer specimens to be found. This is largely due to the fact that until recent years the American demand for Canadian Leicesters has not been strong and the Canadian breeders have retained in their flocks the best of each year's crop of lambs. By selection and careful weeding many good flocks have been built up. The excellence of the Leicester proves conclusively that if the Canadian breeders of other breeds of sheep would follow the same practice the Canadian flocks of all sorts would equal or excel those to be found elsewhere.

The characteristics of the Leicester should, like all mutton breeds, conform in a general way to the standard for mutton sheep appearing in the first part of this work. The Leicester is one of the large breeds, the average weight for mature rams in good flesh being 250 to 300 pounds, and for ewes 175 to 200 pounds.

The head is small for the size of the body and is carried with pronounced erectness and stateliness. The nose is slightly Roman in rams but almost straight in ewes. The ear is thin, moderately long and carried decidedly erect and alert. The head and legs are snowy white in young animals but become darker with age.

The Leicester is classed among the long-woolled breeds; its fleece, however, is of somewhat less length than that of the Cotswold or the Lincoln. The wool is glossy and of good fibre and should cover the entire carcass save the head and legs, although a small amount of quite short wool on the forehead and the shanks is allowable. The wool of this breed hangs in dense spirals which carry their crimp or wave to the skin; the fleece should consist of a mass of distinct curls all over the body and without the 'parting' at the back as in some other long-woolled breeds.

The Cotswold.

The Cotswold sheep takes its name from a range of bare hills in the counties of Gloucestershire and Worcestershire, England, which it has inhabited for a very long period. It is said that the hills take their designation from the sheep rather than the sheep from the hills. They derive their name from 'cote,' a sheep-fold and 'wold,' a naked hill. Historians of the breed describe the original stock as being long-necked, rangey, square of build with strong bone and clothed with fine, soft wool. As early as 1464 sheep of the Cotswold breed were by royal consent exported to Spain to the great advantage of the Spanish flocks. This and other evidence seems to point to a fine-woolled breed quite dissimilar to the long-woolled specimens of modern years. For a period subsequent to the date mentioned there seems to be nothing definite written about them. Two or three centuries later Professor Low, writing of the Cotswold sheep, gives the impression that they are the offshoot of the Midland long-woolled breed inhabiting the level lands.

From the accounts of the various writers it appears safe to infer that the blood of the original fine-woolled Cotswold and the longer-fleeced Midland sheep were fused in the Cotswold of the eighteenth century. Then the blood of the Leicester was introduced which worked a great improvement in the breed from a mutton standpoint. About this time many of the old pastures were being broken up, turnips and cereals began to be cultivated, bringing about conditions favourable to an increase in weight of carcass and length and strength of wool. Cotswold breeders have for a long time preferred and bred for a bold and open curl in the fleece rather than the close spiral of the Leicester. In the early years of the breed grey or light brown speckles on the face or shanks were not looked upon with disfavour, and even at the present day these markings are to be seen in individuals of many of the best flocks, although the Cotswold is looked upon as a white-faced breed.

Whatever the origin of this sheep it is certain that for the past seventy years at least it has been kept pure, so that the type has long since been thoroughly fixed. The Cotswold may be described as a big, upstanding sheep. Compared with the Leicester the Cotswold is somewhat larger and stronger of bone. It is not so broad in the back but possesses greater depth of body. In addition the hind quarters are more squarely developed. A distinguishing characteristic of the Cotswold is the topknot

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or forelock which is never shorn close to the head but allowed to hang over the face, extending in some cases to the point of the nose. The fleece is heavy, wavy and rather coarser than that of the Leicester, and should weigh from 10 to 15 pounds of fairly clean but unwashed wool. It should cover the body in all parts. As a rule the best specimens are clothed to the fetlocks of the hind legs. Like in the Leicester the head is carried quite erect. The neck is rather longer and in many cases shows lack of plumpness, giving a 'ewe necked' appearance which should be reduced as rapidly as possible wherever it is found to exist.

The Cotswold breed stands in high favour both in Great Britain and abroad. Numerous flocks of pure-breds and grades are to be found in France, Germany, Australia, New Zealand, the United States and Canada. They are quite hardy and sufficiently prepotent to stamp their characteristics upon their offspring when crossed with other breeds. The average weight of a mature Cotswold ram in good flesh is about 250 to 300 pounds, and of a ewe 190 to 225 pounds. Highly fitted show-yard specimens reach higher weights than these. They require good pasture but do well on moderate elevations that are not too rugged. The mothers are, as a rule, good nurses and are, therefore, adapted to the production of lambs for the early market. The fattening qualities of the breed are good although the flesh is only moderately fine in grain if allowed to reach more than maturity. As a rule stock that is not to be kept for breeding should be fattened and marketed before they are fifteen months old.

The Lincoln.

The origin of the Lincoln breed was a race of heavy-bodied sheep that inhabited the low alluvial lands of Lincolnshire, and the adjoining localities, on the eastern coast of England. These sheep were large and coarse, carrying ragged, heavy fleeces of oily wool that nearly swept the ground. They had flat sides, hollow flanks and big shanks and feet and were deficient in the leg of mutton. They grew and fattened slowly but made much inward fat, although their flesh is credited with being well flavoured and fine in the grain. When the improved Leicester came into prominence, toward the end of the eighteenth century, leading Lincoln sheep breeders obtained rams which they crossed upon their flocks. By this means the coarseness of their stock was much reduced and in time a new and finer type of the breed was produced.

With improvement in the sheep stock there came a more advanced system of farming, in which heavy crops of roots and fodders were the chief production. With the consequent better feeding of the stock and the increased care given to breeding the improved Lincoln became fixed in character as the heaviest producer of mutton and wool in the world. It is chronicled that in the early days of the breed two-shear sheep frequently dressed over 90 pounds to the quarter, and a lamb 14 months old gave a fleece weighing 26½ pounds.

The Lincoln was first recognized as a pure-breed by the Royal Agricultural Society of England in 1862. Previous to that date all of the long-woolled breeds were shown together, and according to reliable history the Lincolns were usually victorious. They were then, as now, an excellent breed of wool and mutton sheep. They mature early, fatten easily and make rapid gains for the food consumed, but on account of their size require plentiful supplies of food. Their flesh inclines to coarseness after the animals have reached maturity, but lambs and yearlings dress well and produce meat of good quality.

The wool of the Lincoln is unexcelled for weight of fleece and length of fibre, and its fineness is about equal to that of the Cotswold. It is highly valued for the manufacture of coarse worsteds and is in special demand for braids and other manufactures which call for long fibre and great strength. The usual clip of well kept flocks runs from 10 to 14 pounds for ewes, and 12 to 18 pounds for rams, of unwashed wool. A year's growth of wool is about eight inches.

As a grading sheep the Lincoln stands high where greater weight of carcass and fleece are desired, but for the best results the grade offspring should not be kept on sparse or rugged pastures. Lincoln rams have for many years been in keen demand

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for increasing the size and fleece of grade Merinos in the Western States of the American Union, Argentina and Australia. At the annual sales of some of the leading breeders in England rams bring very high prices, many of the best specimens going to Argentina. The chief outlet for the Canadian breeders is the western range States which each year take a good number at paying values.

The breed is white-faced and has a conspicuous tuft on the forehead. The head is massive but not coarse; the nose is somewhat arched and bare of wool. The brisket is full and deep, the body round and well proportioned, and while it is a heavy sheep it is not coarse. It does not reach the weights of its progenitors in carcass or fleece, but on account of its improved quality, brought about by many years of continuous, careful breeding, it is very desirable for its mutton and wool and for the improvement of the common flocks. Mature rams in good flesh reach average weights of 250 to 300 pounds, while good specimens of ewes tip the scales at from 220 to 250 pounds. Highly fitted show-yard specimens frequently reach greater weights.

Compared with the Leicester and the Cotswold, the Lincoln is more massive than either but more nearly resembles the latter in outline. It is rather less active, carrying the head lower on account of possessing a shorter, thicker neck.

The Oxford Down.

The Oxford Down sheep is the product of a cross between the Hampshire Down and the Cotswold. The union was deliberately made by two or three distinguished sheep breeders about the year 1833. It was the desire of these men to combine in one breed the diverse qualities of the long wool and the short wool classes of sheep. In great measure they were successful inasmuch as a large sheep of dark countenance and legs, with Down conformation, and wool of moderate fineness has been evolved. The founders of the breed were Messrs. Samuel Druce, of Eynsham; John Gillett, of Braize Norton; William Gillett, of Southleigh, and Nathaniel Black, of Stanton Harbour. These leaders in the sheep breeding industry lived within half a dozen miles of each other and were joined in their enterprise by Messrs. John Hitchman, of Little Hilton, and J. L. Twyman, of Whitechurch Farm, Hampshire. It is claimed by historians that Southdown blood entered into the foundation stock, but since this breed and the Hampshire Down inhabited districts only a short distance apart, and the type of neither was well fixed at that early date, it may be safely inferred that neither was strictly adhered to in the search for suitable animals for the Down cross. In the first crosses the male was Cotswold and the female Hampshire Down, or in a few cases Southdown. There appears to have been a good deal of intermingling of blood before Oxford Down breeders settled into a line of their own. Mr. Druce decided that best results were secured when cross bred animals on both sides were employed. It was not uncommon for cross bred rams to be used on cross bred ewes that possessed the desired qualities; ewes that were undersized were bred to Cotswold sires, and Down rams were mated with the graded females of coarser type.

For many years the breed was known by various names. As late as 1853 they were known by some as 'Half Breeds,' and by others as 'Down-Cotswolds.' Some four years later at a meeting of breeders held in Oxford the name 'Oxfordshire Down' was agreed upon. Soon after this the more easily pronounced 'Oxford Down' designation was adopted. Since that time no outside blood has been introduced, development and improvement being accomplished by perpetuation of carefully selected stock within the breed itself.

For many years the flocks of various breeders bore dissimilar characteristics indicated in fleece and face due to a preponderence either of the long or the short woolled parentage. This, however, had practically disappeared before the close of the past century. The speckled face has given way to an even brown which may vary slightly in shade without risk of disfavour. The finely cut profile and thinner nose, together with the long and moderately fine ear are undoubtedly vestiges of the Cotswold parent, while the dark face and comparatively close fleece are derived from the Down. Until recent years the upstanding characteristics of both parent breeds were

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conspicuous in the Oxford, but the winners at leading shows at the present day are of more compact form not unlike the larger type of Shropshire in general conformation. This more solid form has been striven for in the effort towards earlier maturity in accordance with the general tendency in the breeding of all meat producing animals of the farm.

The Oxford Down is one of the largest and heaviest of the Down breeds, approaching very close to the Hampshire in this regard. A well fleshed typical ram should weigh from 250 to 275 pounds and a ewe about 175 to 220 pounds at maturity. On account of its large size and the environment of its home the Oxford Down is better adapted to arable than rugged land. It matures early and fattens well on moderate feed. Its flesh resembles that of the Down in fineness of quality and even admixture of fat and lean. As a grading sheep the Oxford Down finds favour when increased size and good mutton quality are desired and the lambs are to be reared amid luxuriant pastures or rich forage. Ewes of the breed are prolific and good nurses. The wool is longer and coarser than that of any of the other Down breeds and is less dense over the body. In well kept flocks the average fleece, unwashed, should weigh from 9 to 12 pounds. Well developed rams frequently exceed these weights at their first shearing.

Compared with the Shropshire, which breed they most nearly resemble, the Oxford is larger in every way; its fleece is more open and longer at shearing time; its head and face are not so dark nor so completely covered with wool, and the head and the ear are longer.

Oxford Downs are to be found in almost every country where improved sheep are reared. They are numerously kept in almost all the provinces of Canada, the United States, Australia and South America.

The Hampshire Down.

The Hampshire Down and the Southdown are closely related. The ancestors of the two breeds inhabited the chalk lands of the South down counties of England since the time of William the Conqueror. The soil on the more easterly of these counties was thin and rugged, furnishing scanty herbage. The sheep raised on these were small in size, compact in form, and noted for the excellence of their flesh. These were the progenitors of the modern Southdown. As the chalk lands extended westward into Hampshire, Berkshire and Wiltshire, the soil became deeper and more fertile, affording better pasturage and heavier cultivated crops. The sheep reared on these lands were larger and coarser than the Southdowns. These were the progenitors of the Hampshire Down. Farther west were to be found in those early days the horned sheep of Dorset and Somersetshire. Through generations the sheep along the border lines of these territories intermingled to some extent so that a well-defined division of breeds was impossible. Early writers state that the flocks of the more northern and eastern of the Hampshire district were more compact and symmetrical in form, with finer wool, than were those in the western portion, where white and speckled ears and faces and curling horns were not uncommon. Further east horns were unknown and the faces and ears of the sheep were of very dark colour. These differences existed through the period from 1815 to 1835. About this time farming lands began to be enclosed and more careful attention was given to stock rearing. A class of sheep was desired that would thrive well on exposed pastures and when put on roots or other cultivated crops would take on flesh of a high quality economically. It was observed that where the blood of the Southdowns had long been merged with their horned neighbours in Berkshire and Wiltshire, the flocks were best adapted to the ends desired. Improvement by selection and breeding was carried on by many farmers. For a time different sections had somewhat different ideals, and thus the breed lacked entire uniformity, but ultimately the best type was demonstrated and generally acknowledged. It was these animals, which are claimed to be a cross between the Southdown and the old Wiltshire horned sheep as well as the Berkshire Knot, that formed the foundation of the Hampshire breed.

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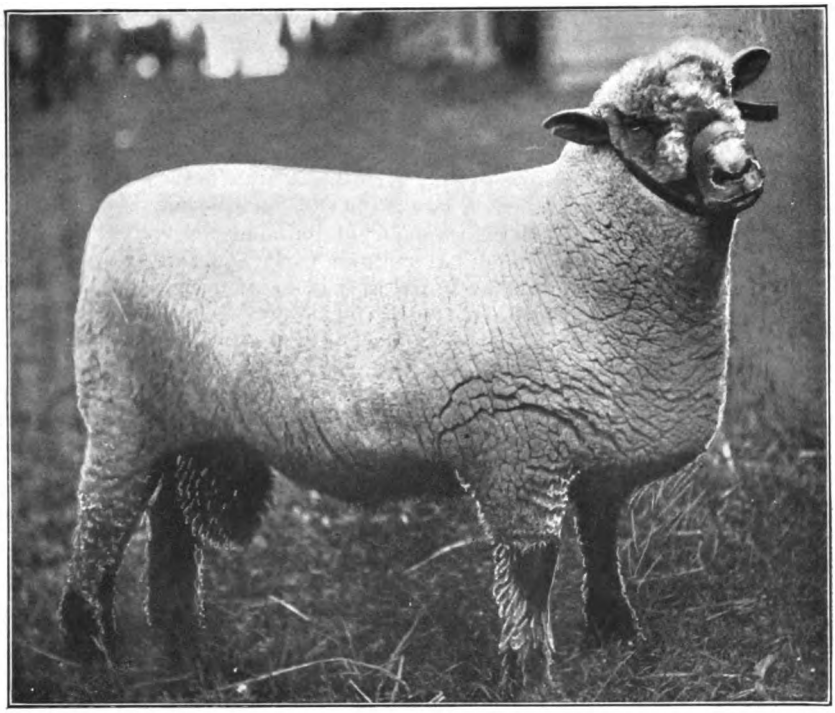

Fig. 12.—Oxford Ram.

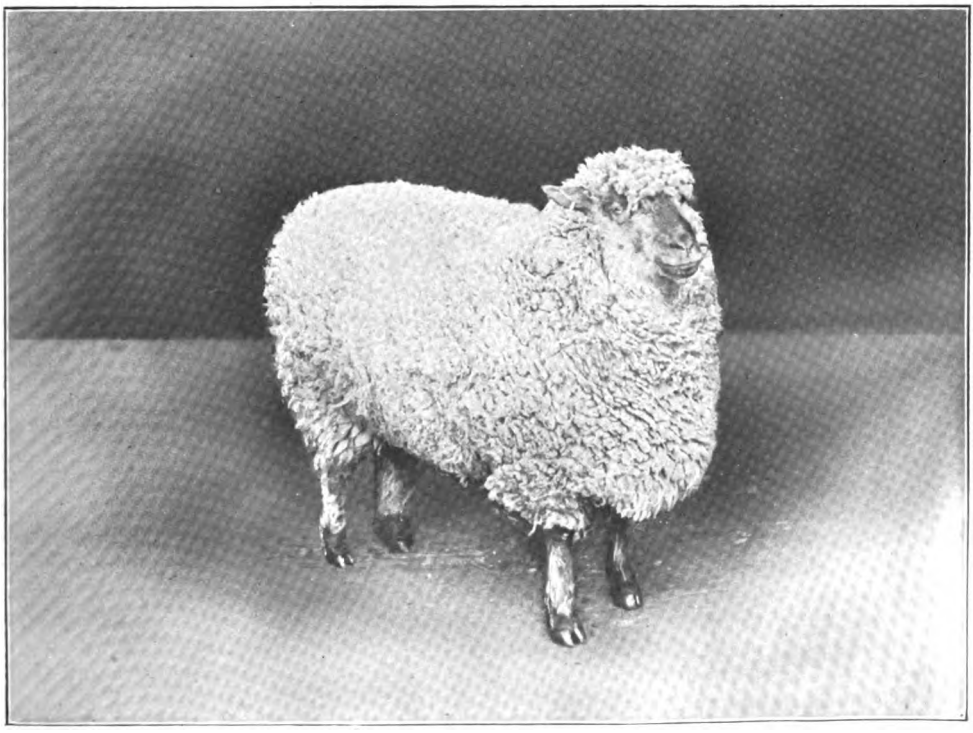

Fig. 13. – Oxford Ewe.

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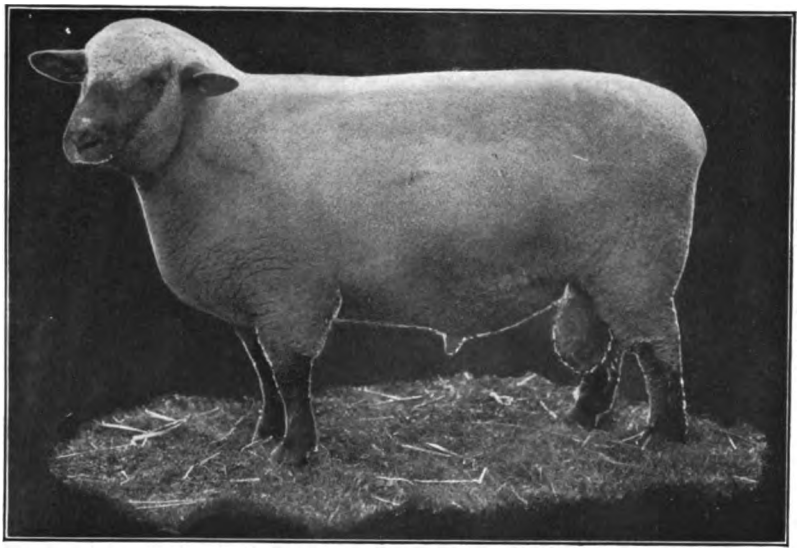

Fig. 14.—Hampshire Ram.

Fig. 15.—Hampshire Ewes.

(Hampshire Lambs represented in Fig. 30.)

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Fig. 16.—Shropshire Ram.

Fig. 17.—Shropshire Ewe.

Fig. 18.—Group of Shropshire Rams.

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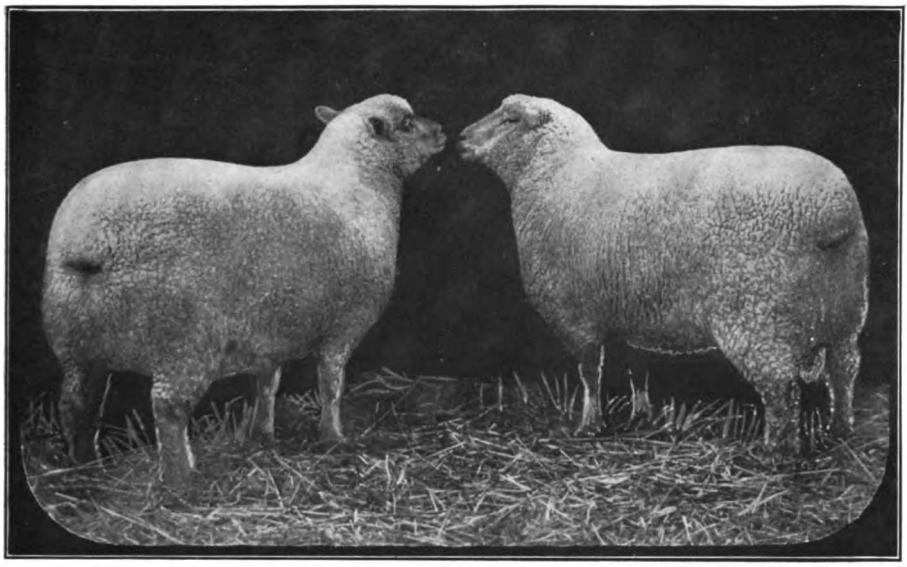

Fig. 19.—Southdown Wethers.

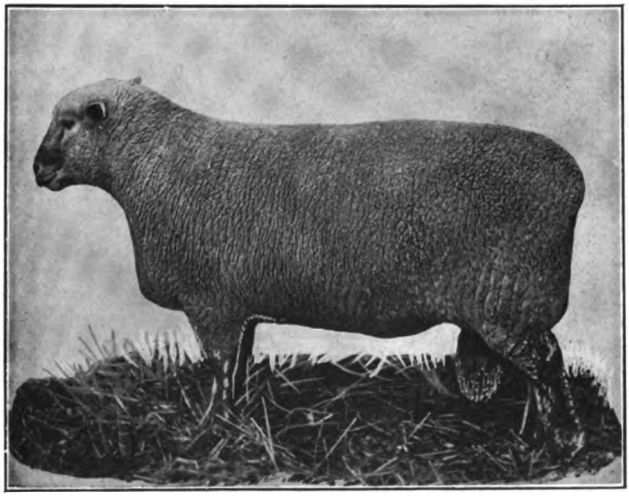

Fig. 20.—Southdown Ram.

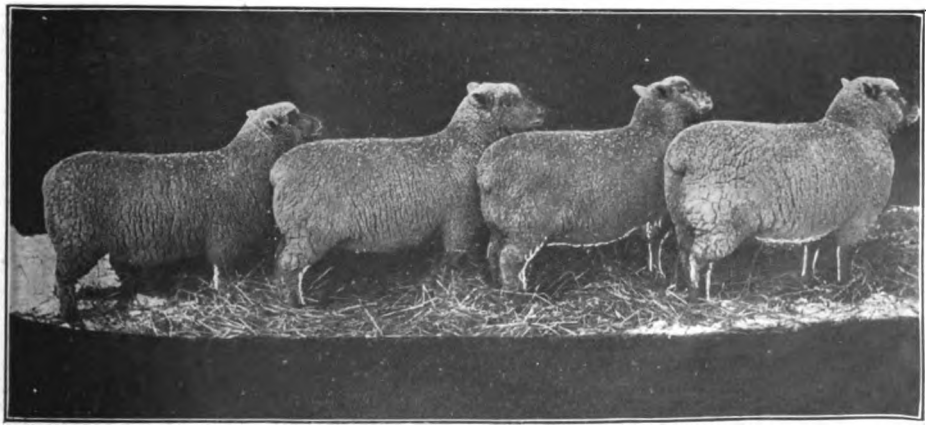

Fig. 21.—Southdown Ewe Lambs.
Southdown Ewes Portrayed in Fig 71.

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Foremost among the farmers who undertook the establishment of the Hampshire breed was Mr. Humphrey, of Oak Ash, a man who unquestionably possessed the peculiar genius required in a first improver of stock. Contemporaries of Mr. Humphrey were Messrs. Lawrence, of Bulbridge, and Morrison, of Fonthill. Mr. Humphrey's first pronounced improvement of the breed was effected by the introduction into his flock of a Southdown ram, bred by Jonas Webb, that won first prize at Liverpool about 1834. The difficulty arising from this cross was loss of size, and to obviate this only the largest of the Hampshire Down ewes that suited his fancy were selected for his breeding flock. These were bred to the most masculine and robust of the rams of his own breeding. This policy succeeded even beyond the hopes of Mr. Humphrey himself. Mr. Humphrey very seldom bought ewes, and never unless possessed of extraordinary qualities. A ewe thus bought, bred Jack Tar by a ram of famous strain. Such blood was used with great caution and never directly. Thus Jack Tar was given a few ewes and their ewe lambs were saved as dams for rams. It was, therefore, only after being well mixed with the blood of the flock that new blood was allowed to permeate it.

The greatest possible care was exercised in selecting the animals that were to be perpetuated. Lambs were judged at birth, and those showing weakness or defects were marked for the feeding pen. Only the best of those remaining were placed in the breeding flock, all others being sent to the butcher, and none of this class were ever sold to other breeders.

In using sires Mr. Humphrey exercised the utmost caution. Lambs were tried on a small number of ewes and if their offspring promised well the ram was again used as a shearling and in subsequent years, but if not he was sent to the butcher. He never bought rams from others and never introduced strange blood straight into his flock. Mr. Humphrey died in 1868, when his flock was dispersed. Many of his rams sold from 40 to 60 guineas each, one of the keenest purchasers being Mr. Rowlings, whose methods of breeding had been much the same as those of Mr. Humphrey. His success as a breeder lay in rigorous selection and careful introduction of the best obtainable rams, which were usually secured from Mr. Humphrey.

The Hampshire is the heaviest of the Down breeds, and is excelled in weight only by the Lincoln and the Cotswold among the long-woolled races. Mature rams in good flesh should weigh from 250 pounds to 325 pounds, and mature ewes 175 pounds to 225 pounds. It matures very early and for that reason is a favourite for getting heavy lambs for the spring trade. The ewes breed well and yield an abundance of milk. While the Hampshire stands well off the ground, it feeds up readily and carries a thick fleshy body of prime mutton. The fleece of the Hampshire is dense and about equal in fineness to that of the Shropshire. Well kept flocks shear fleeces of about 8 to 10 pounds of unwashed wool. The colour of the head is a uniform black with a small top-knot which should consist of white wool. The ears are large, free from mottles and fine in texture; they are carried lower than in other breeds. The shanks also should be of black colour and free from mottles.

The breed is well adapted to either pasture or pen feeding. In its native home on many farms more than a breeding ewe per acre, besides large herds of cattle, are maintained in excellent condition in seasons when fodder is plentiful.

A society for the promotion of the breed and the regulation of a Flock Book was established in Great Britain in the year 1889, in which a similar organization was formed in the United States.

The Shropshire.

The Shropshire as a pure breed is a production of the nineteenth century. It appears to have had a mixed origin, the foundation being a rather diminutive breed, described in 1792 as the Morfe Common sheep, then raised in large numbers in the district of Shropshire, England. These active hardy sheep had at that time black, brown or spotted faces and carried horns. The carcasses of well-fed wethers would weigh from 10 to 14 pounds per quarter, and the fleece about 2½ pounds. This appears

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to have been the parent form, and the work of improvement commenced in crossing with the Leicester and Southdown. While these crosses were being introduced and for a number of years afterwards, the stock produced was of somewhat uncertain type, but by the middle of the past century a well fixed and very desirable class of the Shropshire had been evolved. Soon after this time, through the efforts of their breeders they were recognized as a distinct breed. They were at that time described as being without horns, with faces and legs of grey or spotted colour; the neck thick with excellent scrag; the head well-shaped, rather small than large, with ears well set on; breast broad and deep; back straight, with good carcass; hind-quarters hardly as wide as the Southdown, and the legs clean with strong bone. They were hardy, thrifty, and matured early, producing from 80 to 100 pounds per carcass and about 7 pounds per fleece.

By careful selection and judicious mating of its own spieces, the Shropshire sheep seems to have been brought to a very high state of perfection. In 1853 they received their first recognition as a pure breed by the Royal Agricultural Society of England. Until about 1870 grey and speckled legs and faces and open fleeces were not uncommon, but these markings and other evidences of mixed breeding gradually disappeared. For the past thirty years the colour of the face has been a rich brown, unless covered with wool, as are many of the finest specimens of the breed at the present day, almost to the point of the nose. A little grey or 'mealy' colour about the muzzle is not considered objectionable.

The Shropshire sheep was given a classification separate from the Southdowns, Hampshires and Oxfords as early as 1859, and soon after that year far surpassed any other breed exhibited in point of numbers. In 1884 the display of Shropshires at the Royal Show, held at Shrewsbury, numbered 875 against less than half that number of all other distinct breeds combined. The breed rapidly spread to every part of the United Kingdom and is now to be found in large numbers in all parts of the world where improved sheep are kept.

No single outstanding breeder, like Bakewell, Ellman or Humphrey, who are credited with bringing out the Leicester, the Southdown and the Hampshire, respectively, actually accomplished the chief improvement of the Shropshire. This was shared by many and progress seems to have been gradual.

Going back to the fifties of the last century, we find the names of prominent breeders as follows: Messrs. Henry Smith, of Sutton; Green, of Marlow; Harton, of Shrewsbury; Farmer, of Brignorth; Adney, of Harley, and others whose ewes were at that time sold at auction for prices from $40 to $75 per head. The flocks of these breeders and others may be looked upon as the foundation of the present breed and their blood flows in the flocks of the present day.

As a combined wool and mutton sheep the Shropshire holds a prominent place. The body, though larger, is like that of the Southdown, being low-set, thick and fleshy. It carries a large proportion of lean meat which is held high in favour by butchers. The fleece is dense, uniform and approaches that of the Southdown in fineness; ewes shear from 7 to 10 pounds and rams from about 9 to 12 pounds of unwashed wool.

For crossing and grading the Shropshire occupies a wide field. Rams of the breed are very generally used upon common and grade Merino stock in the range districts. Even from quite inferior ewe foundation the offspring from Shropshire males is blocky, thrifty and early maturing, almost invariably showing dark faces and legs. At many of the fat stock shows grades bearing Shropshire characteristics win many of the best prizes. The early maturing qualities of the Shropshires are peculiarly valuable owing to the extent to which they are used in crossing.

Shropshire breed associations are strong both in Great Britain and America and pedigree registration is carefully maintained in both countries. The American Shropshire Registry Association was organized in 1884, and up to the end of 1907 more than 270,000 animals bred chiefly in Canada and the United States, had been registered. A large number of pedigrees have also been registered in the Canadian National Records.

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The Southdown.

The Southdown is the oldest of the improved medium-woolled dark-faced breeds of sheep. It bears much the same relation to the Down breeds as does the Leicester to the other long-woolled races. It is one of the indigenous races peculiar to the chalk hills of the southern counties of England. It appears to have been confined to the Down lands and to have given way to a larger and looser framed animal, as the chain of chalk hills on which it browsed passed into the neighbouring county of Hampshire.

Originally the Southdown was horned, but these appendages have long since disappeared unless as slugs which occasionally appear on rams of the coarser type. The breed, before improvement, was small, long in neck, light in shoulder, bare of back, drooping in rump, but having a big leg of mutton. The fleece was not so close and firm as now, and inclined to curliness.

One of the earliest improvers of the breed was John Ellman, of Glynde in Sussex, who commenced his work about 1780, and died in 1832. This breeder laid great stress upon the form of the neck and fore-quarters, which he felt should be bold, high in the crest, muscular and thick. These he aimed to develop as well as spring of rib, girth, breadth and fullness of quarter. The leg of mutton, according to Mr. Ellman, 'must be well filled inside and out, and as round as a 'cricket ball.' The fleece under his care became boardlike in its firmness, and showed cracks down to the skin as the animal turned, presenting a firm and springy surface. Following Mr. Ellman came the late Jonas Webb, of Babraham, Cambridgeshire, as an improver of the breed. It was through him in a great measure that the true type was handed down to the present generation.

The Southdown is one of the most beautiful sheep existing; its smooth, even body; its round, clean barrel; its short legs, fine head and broad saddle, with its sweet, tender seldom overfat meat, give the qualities which make it desirable to the lawn of the gentleman, while its early maturing and easy feeding qualities give it a place on the farms of the men who must make profit from the products of the land. It is the smallest of the medium-woolled breeds, but owing to its compact form it weighs remarkably well for its size. A well developed ram in breeding condition should weigh about 200 pounds, and in show form from 225 pounds to 240 pounds. Mature ewes should weigh from 150 pounds to 200 pounds, according to condition. It is best adapted to undulating, rolling or broken and hilly land bearing a short, fine herbage, but it adapts itself well to more level areas that are not wet. It matures early, its feeding qualities are unsurpassed and it stands crowding both in pen and field better than most breeds.

The fleece of the Southdown is the finest and shortest of the Down breeds. Unless at times of a shortage of coarser wools the wool of this breed brings a higher price than any of the others. It is dense and as a rule very uniform over the body. An average Southdown will clip from 5 to 7 pounds of unwashed wool.

For crossing purposes the Southdown has been particularly useful, and its blood exists in every improved Down breed. On account of its long established characteristics it stamps its good qualities upon its offspring in a remarkable degree.

The face, ears and legs of the Southdown are of a uniform shade of grayish brown or mouse colour. The forehead and cheeks are well covered with wool of the same density and whiteness as found on other parts of the body. The ears are rather small, tolerably wide apart, covered with fine hair and carried with a lively back and forth movement.

The Southdown represents the ideal form of mutton sheep, inasmuch as it is admirably proportioned, of perfect symmetry, very compact and short in the leg. It is spirited and attractive, with a determined look and proud firm step.

The Suffolk.

The Suffolk sheep, of which there are only a small number of flocks in Canada, belongs to the Down breeds inhabiting in their early days the southern counties of

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England. Although larger, more rangey and darker in points than the Southdown, the blood of this latter breed entered largely into the foundation of the Suffolk. The only other breed that entered into the combination was the Norfolk, which appears to have passed out of the list of modern breeds of sheep. The old Norfolks are described as upstanding, robust, active and prolific, bearing horns in both sexes, jet black faces and legs, and clothed with fleeces of fine, soft wool that would weigh at shearing time about three pounds. Their home was the chalky Downs in the counties of Suffolk, Norfolk, Cambridge and Essex. The Southdown inhabiting adjacent counties, as already described, is a thicker, lower-set sheep, having strong powers of prepotency. Rams of this latter sort were crossed upon ewes of the old Norfolk to form the newer breed of Suffolk.

To the establishment of the Suffolk much credit is given to Mr. George Dabito, of Lydgate, who is said to have been an enthusiastic advocate of the Southdown and Norfolk combination. While the name Suffolk was not generally adopted until 1859, when classes were created for this breed by the Suffolk Agricultural Society, flocks are said to date back in purity of blood to 1810.

In recent years the Suffolks have held their own in British show rings in competition with other short-woolled breeds. In 1883, 1884 and 1885, they defeated all others at the shows of the Royal Agricultural Society, and have since won valuable awards in the wether sections in open competition at the Smithfield Fat Stock Show. Appearing somewhat spare of body on account of bareness of head and legs and comparative shortness of wool, this breed does not appeal as favourably to one unaccustomed to them as most of the other Down sorts, but it is on the block, the true test of all meat animals, that they give a good account of themselves. Their flesh is seldom or never over-fat, but fine in the grain and of strikingly fine flavour.

Being active and very hardy the Suffolk subsists well on either sparsely clothed hill sides or more luxuriant pasture. The strong infusion of Southdown blood, together with the care exercised in breeding during recent years, have given the Suffolk early maturing qualities. Flocks produce a high percentage of vigorous twins, which usually develop rapidly on account of the generous supplies of milk produced by their mothers.

The Suffolk Sheep Society of England was established in 1886. The first importation was made to Canada in 1888, and a few flocks have since been established in Ontario, Prince Edward Island and British Columbia. The first Suffolks taken to the United States were imported in 1888, but many have been imported since, and in 1892 the American Flock Registry Association was established.

Compared with other Down breeds the Suffolk more nearly resembles the Hampshire, and at some of the large shows even yet these two sorts are classed together. They are, however, somewhat less in size and weight, but are heavier than the Southdown or the Shropshire. Mature rams in good flesh should weigh from 240 pounds to 260 pounds, and ewes 190 pounds to 210 pounds. They are longer than the Shropshire in body and limb. The head is longer, narrower and bare of wool, although a small patch of short white wool on the forehead is not objectionable. The head and legs are glossy black. In wool production they shear a little more than the Southdown, of a quality about equal to the Hampshire or the Shropshire.

The Dorset.

The Dorset Horn is one of the oldest of the British breeds of sheep. It inhabited from a very early date the fertile counties of Dorsetshire and Somersetshire, situated in the southwest of England. The home of the breed is diversified by hill and dale affording thin chalk highlands and rich clay slopes and valleys. The original Dorset sheep was a large, rather course, long-legged breed with wonderful powers oof maturnity. Both sexes have retained horns from the earliest years until the present day. They belong to the medium wool breeds, but unlike most of the others, possess white faces and legs. Efforts to improve the breed by means of out crosses proved unsuccessful, although, according to authorities, both Leicester and Southdown blood were used.

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While great improvement in form and early maturing has been accomplished in the Dorset sheep during the past quarter of a century it has been effected entirely within the breed itself.

The Dorset surpasses all other breeds of sheep in breeding qualities. Unlike other sorts the ewes may be bred at almost any time of year, and it is not uncommon for ewes to produce two crops of lambs within twelve months. In England it is not uncommon to find Dorset lambs on the Smithfield market at Christmas, when they command fancy prices. A number of breeders both on this continent and Great Britain aim to have autumn lambs, some as early as September, although many prefer not to have them earlier than January. The Dorset ewe is a most excellent mother, producing seldom less than two lambs and not uncommonly three. She is a very copious milker and when well fed her lambs go forward at a very rapid rate. For this reason the Dorset fills a special field as a producer of what are known at 'hot house' lambs, which frequently dress from 40 to 45 pounds each at four months old.

In general conformation the Dorset is of the mutton type, approaching that of the Southdown more nearly than any of the other breeds. It is larger than the Southdown, being almost equal to the Shropshire, and it has less symmetry than either of these sorts. The average weight of mature rams is about 220 pounds and of ewes about 170 pounds.

The wool of the Dorset is much like that of the Shropshire in quality. The fleece is quite dense, very white and elastic. The crown and jaws are covered about the same as in the Southdown. Well bred rams clip about 10 pounds, and ewes from 7 pounds to 8 pounds of unwashed wool.

The horns of the Dorset curve gracefully forward rather close to the jaws. They are small and flat in the female, but considerably longer, stronger and more angular in the male and curve spirally outward from the top of the head.

As a crossing or grading sheep the Dorset stands in high favour in the United States, more particularly where Merino grades exist. They impart their fecundity, vigour, excellent milking qualities and thick mutton form to their offspring in a marked degree. On account of their horns they are not well suited for crossing upon hornless breeds. If used at all for crossing with the latter sort the Dorset should occupy the female part of the union. Dark-faced lambs produced in this way meet with a readier sale than the lambs of pure Dorset breeding, and when fed for the show-ring they frequently win prizes in the classes for grades and crosses.

Until about 1885 the Dorset was little bred outside of its native counties. During recent years small flocks have been established throughout other portions of the British Isles. They were imported to Canada as early as 1885, and to the United States in 1887. There are now a number of well kept flocks in various parts of Canada and many in the United States.

The Cheviot.

The Cheviot, although not familiar to the sheep farmers of Canada, is becoming a favourite breed wherever given a fair trial. Coming as they do from a rugged country they possess a peculiar adaptability for hilly sections where daily attention cannot be given.

The Cheviot is one of the oldest of the modern breeds of sheep. It is classed with the mountain breeds and comes next in hardihood to the Black-Face that inhabits the Highlands of Scotland. Its home is the hill lands bordering Scotland and England, where they have been reared from a very remote period. In their native homes they are given no shelter and graze the year round on the mountain sides and in the valleys. This open air life has developed in the Cheviot one of the hardiest of the medium-woolled breeds of sheep.

It was about 1756 that an effective attempt was made to improve the Cheviot. During that year four leading breeders visited Lincolnshire and returned with fourteen rams which they used upon their flocks with great success. It is stated that the flock

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of Mr. James Robson, of Philhope, was so much improved by the Lincoln cross that for many years he sold more rams than one-half of the hill farmers put together.

The breed was named about 1792, when it was described as a fine-woolled breed. From 1800 to 1860 the Cheviot sheep was more and more on the ascendent and the Black-Faces disappeared from nearly all of the best farms in the south of Scotland, except in the mountain districts of Ayrshire and Lanarkshire. Owing to a series of severe seasons the tide turned in favour of the Black-Faces on all but the lower and grassy slopes of the mountains, where the Cheviot until this day maintains its position.

They are of medium size, approaching the Shropshire in weight. Ewes weigh from 150 to 160 pounds and rams from 180 to 225 pounds. They are white-faced and hornless and are possessed of unusual length of body in contrast with the heath sheep of North Britain. Like most mountain breeds they are relatively light in the fore-quarters, but their hind-quarters are very well developed, producing legs of mutton of very high quality. The mutton of the Cheviot, like that of other mountain breeds, is of excellent quality. It seldom becomes too fat, developing rather a plump carcass of mixed fat and lean which is possessed of fine flavour and tenderness.

The wool of the Cheviot belongs to the middle class. The fleece has a tendency to openness and is somewhat longer and coarser than the best type of Shropshire staple, and is rather superior in quality to that of the Oxford. Ewes shear from 6 to 9 pounds and rams from 8 to 12 pounds of unwashed wool.

The Cheviot is possessed of extraordinary constitutional vigour. It is highly prolific, the ewes yielding twins more than single lambs. The ewes are unusually attentive to their offspring, which are rapid growers, making a dressed weight of 50 to 60 pounds at six months old.

In a general way the form of the Cheviot is much the same as other good mutton breeds. The head, while not too heavy, should be bold and broad, well set off by a bright dark eye and erect ears of moderate length. The nose is Roman in type, the skin around the mouth being black. The legs, face and ears are covered with clean, hard, white hair.

The Cheviot is peculiarly adapted to hilly and rolling sections. It thrives well on even scant pasture, provided it has access to an extended area, and fattens readily on roots or good pasture or fodder even without a grain ration. The breed is thoroughly at home in the maritime provinces and the more rugged portions of Quebec, where a few flocks are now being kept.

The Merino.

While the Merino has made great progress in the American republic it has not become a popular breed in this country. In Canada, as in Great Britain, a sheep has to possess at least a fair degree of mutton quality in order that it be taken up either by the breeders or the general farmers who keep a few head of sheep. On the ranges, however, the major part of the foundation stock is Merino, and though the mutton ideal is predominant over Canada as a whole, there are evidences that there will continue to be periodical, if not steady, reversions to Merino blood as long as open range is available. This is not due entirely to the superior herding qualities of the Merino, but to the demand of our growing manufacturers for a grade of wool above coarse or medium. Range wools have greatly increased in value within recent years. This should encourage the progress of sheep husbandry, and in this work the Merino will perform an important part. While our interest in the sheep business has been up to the present almost exclusively concerned with the meat side, it must be remembered that mutton is only one, and not the most important one, of our meat products, while wool is a characteristic and peculiar product and it is on the wool side that we should expect to see general improvement in sheep husbandry secured.

The Merino is a fine-woolled sheep. It is known to have been bred almost entirely for its fleece since early in the Christian era. For a number of years attention has been paid to the mutton qualities of some families, but as a meat-producer the Merino

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ranks in sheep no higher than the strictly dairy breeds in cattle. It is quite conceivable, however, that the introduction of the Merino families of sheep to the rich grasses and more rigorous air of the upper temperate latitudes will be attended with an improvement in fleshing qualities and general rotundity of form.

The Merino is of Spanish origin, but large numbers have been so long bred in Germany and France that certain varieties are now looked upon as belonging to these latter countries. For many years importations from various European countries have been made to the United States, where they are bred in more or less distinct classes. These are known as the American, the Delaine and the Rambouillet. The American or Spanish is the smallest and lightest in weight and are still bred almost entirely for fine wool. The Delaine is a heavier bodied sheep with fewer or no wrinkles and of varying uniformity according to the view point of breeders as regards the relative importance of fleece or flesh. The Rambouillet or French Merino is the largest of the breed, having been bred and fed for mutton production for many generations both in France and the United States. Weights of individual rams are recorded as high as 400 pounds, and fleeces as heavy as 60 pounds. These, however, are quite exceptional and abnormal. It is probable that such a ram was loaded to the utmost extent with fat and such a fleece with oil or yolk and dirt.

Merinos are reared in large numbers in Australia, New Zealand and Argentine, but as already stated, their popularity in North America is chiefly confined to the United States, where some thirty or forty years ago about 95 per cent of the sheep were from Merino foundation stock. In recent years the English breeds have been so rapidly introduced and so numerously bred in the United States that the ratio is greatly changed in favour of the mutton sorts. Over the western plains mutton rams are being used almost exclusively until thousands upon thousands of the sheep and lambs that reach the large United States markets bear one or more English crosses upon Merino foundation. Lambs bred in this way readily partake of the mutton form, and when well fed frequently top the market.

From time to time small flocks of pure Merinos have been started in Canada and a small number are being perpetuated in their pure state at the present day, but only as a foundation stock for grading purposes has this breed reached the Dominion in any considerable numbers. To stock up ranges in the western provinces low priced Delaine ewes with some admixture of Rambouillet blood have been imported in large numbers from Montana and other western States, and these are being graded up with rams of mutton breeds. Under range conditions young stock matures slowly and the great bulk of the mutton is disposed of as one, two and three-year-old wethers. Few of the lambs are sold off in the fall for immediate killing, but during the past three seasons several thousand head have been fed through the winter on hay and screenings at elevator centres and have come out in excellent condition for the late winter and spring trade.

The Merino as a breed is among the lightest of registered sheep, the average ram weighing from 150 to 200 pounds, and ewes from 90 to 130 pounds, but among the Rambouillets as high as 200 pounds in ewes and over 300 pounds in rams are occasionally met with. The breed has proved itself adaptable to a wide range of conditions, doing about equally well on sparsely clothed hills and fertile plains. It withstands crowding and neglect and travelling long distances for food better than other classes of sheep. For these reasons the Merino multiplies well in large bands under range conditions where individual attention cannot be given to the members of the flock, though it is not as prolific by habit as are the English breeds.

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Fig. 22.—Group of Suffolk Ewe Lambs.
Suffolk Ram Portrayed in Fig. 70.

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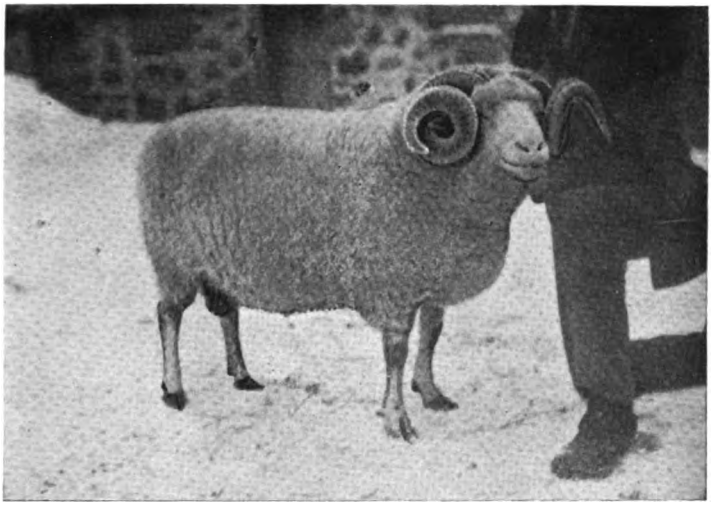

Fig. 23.—Dorset Ram.

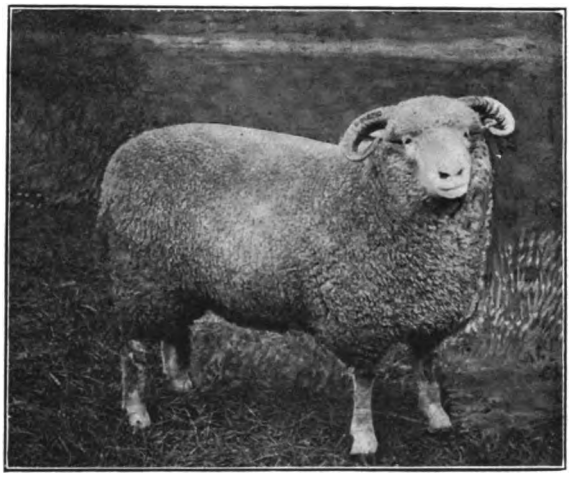

Fig. 24.—Dorset Ewe Lamb.

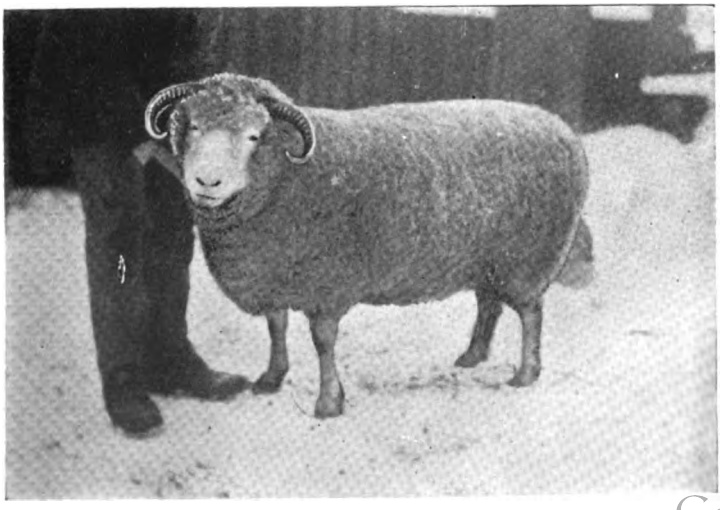

Fig. 25.—Dorset Ewe.

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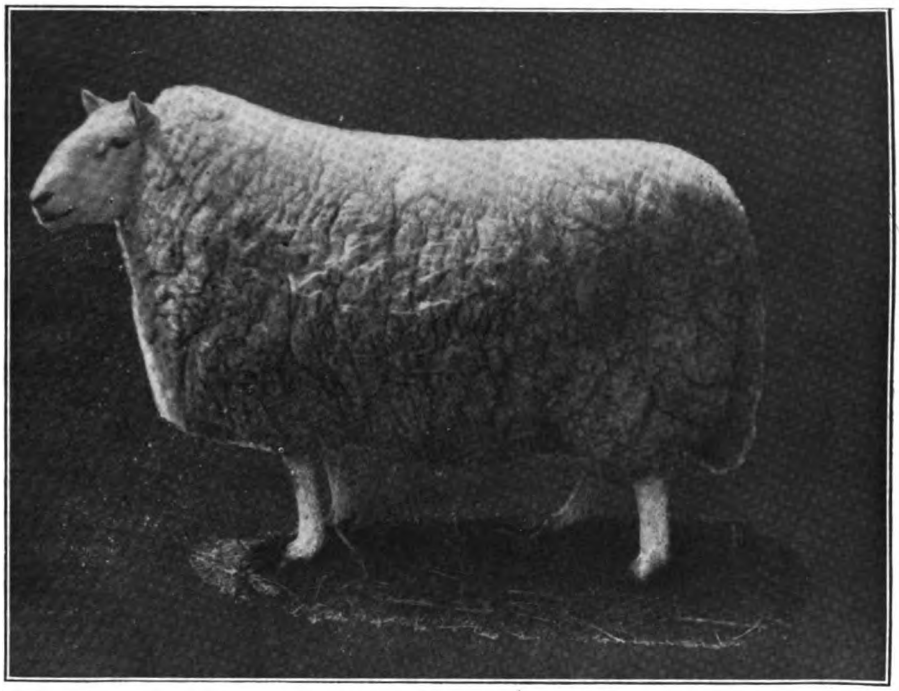

Pig. 26.—Cheviot Ram.

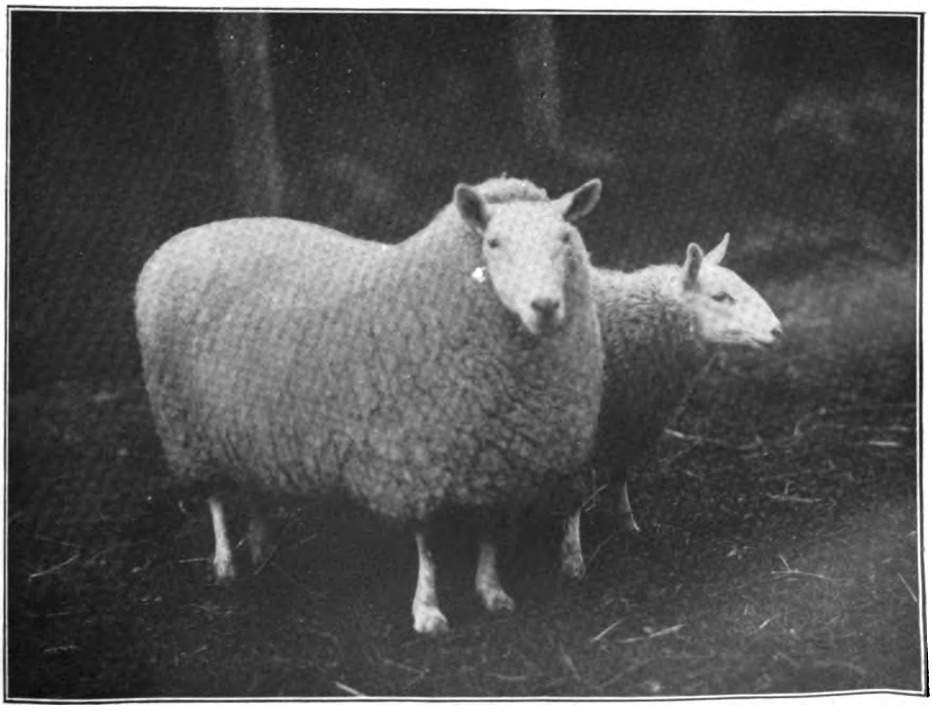

Fig. 27.—Cheviot Ewe and Lamb.

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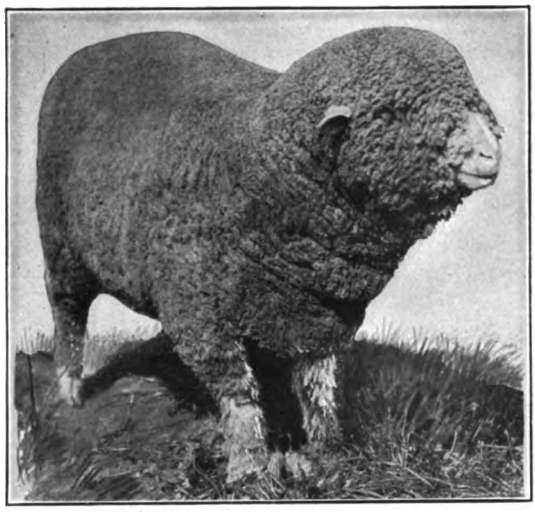

Fig. 28.—Merino Ewe.

Fig. 29.—Merino Ram.

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Fig. 30.—A Flock of Hampshire Lambs. (Note uniformity of type.)

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ESTABLISHING A FLOCK OF COMMERCIAL SHEEP.

The advantages at the hand of any intelligent farmer, who wishes to establish a flock of sheep for use in a commercial way at the present time are very much greater than prevailed many years ago in the older provinces of the Dominion. Then the only material at hand for the foundation of a flock of grade sheep was the 'Common Sheep,' as they were frequently called; and common they were indeed in at least two important ways in which the word is used. They prevailed everywhere on the farms of the English-speaking people of the Dominion and they lacked every indication of good breeding, as evidenced by the qualities making for a present-day first-class carcass. But they were hardy and looked out for their own sustenance so well as to be very little expense to their owner in that way. Yet they were nimble at scaling the fences of those days, and made trouble to him and his neighbours to keep them from feeding on the growing crops.

They were rather long legged, shallow bodied and thin fleshed. Their wool was not very fine, though dense and short and usually quite coarse on the hips and thighs, and worse still, became very scarce before two years old, and quite bare on the under parts and the neck.

Those who used these sheep as a foundation for flocks found that it took several generations from the use of good mutton type rams of the pure breeds before their crop of lambs would have the uniformity necessary to success.

At the present time it is quite different, and the beginner has grade flocks practically pure of the several breeds to choose from, and can commence with a selected flock of grades of whichever breed he may fancy, practically pure to the type of the pure-bred. For many years the best breeders of all the breeds have been striving to establish in their respective flocks the same ideal form of carcass, varied only in size. It will be necessary to have this ideal in view when making selections. A well-covered back is required, broad because of well sprung ribs, and wide loin, the flesh smooth and elastic to the touch—if in good condition, and not soft and blubbery, nor yet hard. In no case should the back bone be in evidence to the touch, if the animal is in good flesh. We should look for long deep full quarters, well filled in the twist, and inside and outside muscles of the thighs. In the points given we have the most valuable parts of the carcass. But in addition we require a good depth of rib, good depth and width in front and at the heart, to give room for the vital organs, so we may have sturdy constitution. With these will go a medium length of neck, stronger at the shoulders and well set on. A clean intelligent head and eyes, with nothing sluggish in appearance, bright eyes with reasonable prominence are all desirable.

We must be careful to select ewes with good firm bone, and strong, short pasterns, not set back too far, feet of fair size and good shape, the legs straight and set squarely under them.

We must pay a great deal of attention to the wool also, in making selections. The heavy shearers—when the quality is right—of whichever breed we have, are the most profitable, and in order to get weight of fleece we must have density of fibres, as well as length of staple. It is of great importance to have it uniform in quality all over the body, not running to coarseness on the thighs.

After we have clearly in mind the type we want, then the thing of greatest importance to us, is to have our selections uniform. There is profit in this because we can sell a uniform bunch of lambs to better advantage, and for a higher price. By uniformity more is meant than that the flock be of the same type, and similar in size. It means not only that they look alike, but that the individual sheep be uniform in itself, that it has general uniformity, good conformation, not weak in places and extra good in others.

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Selecting a Ram.

In selecting a ram, too, this individual uniformity is particularly important, since in this at least he is really half the flock, and with his better breeding is likely to reproduce his conformation and type in the lambs.

A medium size will be found the most desirable, with an inclination to good size rather than undersize if varying any from medium. Roominess should be looked for in the ewes, as those of that form will be more likely to be good mothers. Avoid a ewe that is short in the ribs and has a 'tucked up' appearance. In the ram we must have the same good qualities of carcass and of wool, and should look for more compactness and strength, in appearance a good lot of masculinity, a strong, bold carriage, stronger bone, and with all not any above the average size for rams of his breed. He must be pure-bred and typical of the breed we have selected. It is almost invariably a mistake to cross, except for a special purpose. Continuous indiscriminate crossing is always suicidal.

The Size of the Flock.

A flock of fifteen ewes should be the minimum on a farm of one hundred acres which is devoted to mixed farming. Such a flock can be increased with experience, but not beyond twenty to twenty-five, unless it is desired to make a special business of sheep raising. With good management and good care, an increase through lambs can be expected of from 150 per cent to 175 per cent, and it should be the latter.

A flock of this size will, if given opportunity, clean up a very great number of the weeds on a farm, yet we must not make the mistake of expecting them to get all their living off the weeds and waste places of the farm, even though it is a good help. Provision for feed supplementary to the pasture, such as rape, which can be very cheaply produced, is generally very profitable, and should always be counted on. Lambs after being weaned gain in weight very rapidly on rape, and when oats are fed along with it towards the finishing for the market, the flesh is firm and good, likely to bring the highest price. If fed on for marketing in March, which is usually the most profitable, the rape makes a good foundation for the winter feeding. These supplementary foods are desirable to develop the flock profitably.

Time to Purchase Ewes.

The best time to purchase the ewes is August, just after the lambs have been weaned. We can purchase them as cheaply as at any time and can make the best selection if choosing ewes that have raised lambs as their milking qualities and strength can be ascertained. Besides we will have them in good time to prepare for the next crop of lambs.

While there is one additional year's usefulness in a shearling ewe, one that is sixteen or seventeen months old, if she has not had a lamb, still as a rule two-shear ewes are to be preferred in selecting. We have then a guarantee that they are breeders, and have the advantage of being able to judge of those likely to be the best breeders and best milkers. However, very few shearling ewes prove non-breeders. These ewes should have the run of the stubble fields—not sown to clover, or old pastures, until near the middle of September and then given access to a rape or clover field. If this green food is not plentiful, it will pay to feed a small quantity of grain to make sure the ewes are strong and thriving well when bred. This is the secret of having a large percentage of twins dropped. It may be well, as claimed by some, to breed from ewes themselves twins, but even so, they must be strong and thriving well to have the best results, because not only will we have larger returns, but the lambs will be stronger and more likely to live and do well, providing the treatment of the ewes continue good up to lambing time.

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Mating.

The ram also should be hearty, rugged and healthy at the time of coupling Usually stronger lambs are sired by rams one year old or over, yet for a flock of about fifteen ewes, a well developed lamb will give good results, and may be more cheaply purchased, as well as being a year younger and perhaps more valuable when a change of ram is to be made. But when the number of ewes runs up to twenty or more, then an older ram should be secured.

In case a lamb is used on from fifteen to twenty-five ewes, which should be avoided if possible, he should not run with them, but should be kept separate or with, say one ewe for company, and allowed with the flock only long enough each morning to serve once such ewes as are ready. More than that is needless and helps to destroy the vitality and usefulness of the ram. If short of help, or if one does not wish to take the time, which need not be much, a ram may be allowed to run with a small flock of ewes during the mating season without much apparent injury, if the ram be matured. However, it is profitable to control a lamb, as he is often more ambitious, and more likely to injure himself, and naturally produces weaker lambs. The profit from the flock is largely dependent upon the number of uniformly well grown lambs we raise, and which we can have by these reasonable precautions, and after care and attention, if the ewes are good milkers.

Wintering.

The flock should be strong and in good flesh when the winter sets in, and they will be, if reasonable provision has been made for fall feed. If in good condition they will be the more cheaply wintered. They can be kept doing well on clover hay and a few roots—say three pounds per head each day and a liberal feed of pea straw. If a little grain be fed for about four weeks before they lamb—one pound per head each day of mixed oats and bran is good—they will be in good condition when lambing time comes. The grain feed should be doubled after lambing and the quantity of roots (mangels or turnips) increased to nearly all they will eat. This will insure a good flow of milk, and it is during the first two months a lamb is sent on the road to profit or becomes stunted and small. After that age they can more easily be helped by other foods.

The reason for not feeding the ewes largely with roots before lambing is that they are bulky and cold, being largely composed of water, and when eaten in large quantities seem to affect the fœtus so the lambs are born soft and weak and very difficult to save. Either turnips or mangels can be fed to ewes with safety, although very many prefer turnips before lambing and mangels after, because the latter are considered better milk producers. But mangels should never be fed to rams. They have the effect of producing stone in the bladder, and sometimes cause serious loss. Turnips do not have this effect and sheep should have some succulent feed when not on pasture. Ensilage is not a safe food, it often, or generally is too acid, and will cause severe indigestion, which will in turn cause a loosening of the wool by feverish heat in the skin, and much of the fleece is often lost besides lowering the vitality of the sheep.

Lambing Time.

The lambing time is the only one when for a few weeks the flock is exacting of the time of the shepherd and his attention. It is very profitable to be often with the ewes at that time to see that the lambs when they are dropped are not allowed to get chilled, or become weak for want of a little nourishment soon after they are born. It is well to have a few little pens, which can be readily made with movable hurdles in one end or corner of the large pen. The ewes seldom refuse to mother their lambs when they are separated from the flock, and alone with them. Ewes seldom require any assistance in lambing, but often a little prompt help to a weakly lamb will save its life, and after they are once on their feet, and have found the teat, are very little

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more trouble, unless the ewe is a poor milker, when it will be profitable to assist the lambs with a little cow's milk until they eat well.

Their tails should be docked when the lambs are not more than ten days old. If left longer, or until they get very plump and fat, death sometimes ensues from the shock, and occasionally from loss of blood. The latter can often be prevented by tying a cord tightly around the tail just above the place of cutting, and danger from the former is lessened by cutting one joint or so longer. The ram lambs should be castrated at the same time.

Shearing and Dipping.

Shearing should be done as early in the spring as possible. The beginning of April is usually a good time. Very soon after the ewes have lambed, or, if they come in later than that, then before they have lambed. If not shorn until after lambing, then all tags should be trimmed from around the udder before or immediately after lambing. If this is neglected, the lambs sometimes will suck those tags and swallow them, frequently causing balls of wool to form in the stomach, which cause inflammation and death. This occurs also sometimes when sheep are allowed to get very much infested with lice or ticks, causing them to bite and pull out their wool, swallowing a portion of it, and the balls form in the same way.

Just as soon as the weather is warm enough in the spring, all the sheep and lambs should be well dipped in some of the good dips that are sold. A vat can be very cheaply made for this purpose and the work quickly done. They should be dipped again in the fall, before the weather gets very cold. A half-day for the purpose is a very profitable investment; vermin left on the sheep to go into the winter will be very expensive for the owner.

The Flock at Pasture.

After the flock has gone to the pasture, they will not be much trouble except to see that they have plenty of clean water and salt. To have plenty of clean water all the year round is very important to insure the thrift of the flock. Do not let them depend on snow in winter—they will not do so well—nor let them drink from a stagnant pool at any time. They are very liable to take parasites into their system, which will cause trouble. If it can be arranged to give the flock a change of pasture every two or three weeks, and not necessarily to better pasture, they will thrive and do much better. To alternate them between two fields every few weeks will answer the purpose.

Weaning.

August, from 1st to 15th, is a good time to wean the lambs. They will do better after that if separated from the ewes, and are given a nice fresh bit of clover or rape to run on, and besides it gives the ewes a chance to recuperate and gain in flesh. The ewes' udders should be watched closely for a short time after weaning, and stripped out, when necessary, until the milk has left them. If any have bad or spoiled udders they should be marked for drafting out, and careful note should be made of which are the best milkers. One of the important things that make for success, is in having the ewes good milkers; other things being equal the good milkers raise the best lambs. The lambs' as well as the ewes' tails should be trimmed neatly square across up to the stump of the tail before being turned on fresh green feed such as rape or clover, so they will not soil their wool so much behind if they become soft in their dropping, which they often do.

Precautions in Rape Feeding.

When lambs or ewes are turned into rape they should have access to other pasture, else sometimes their ears, and occasionally the whole head will swell, and blister as when frozen, and often the ears will drop off. If allowed other pasture with the rape

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there is very little danger. Sometimes losses come from bloating when the sheep or lambs first have access to the rape, or even to fresh clover. But this can be avoided by a little reasonable care. They should never be allowed to feed on the rape the first time when any moisture from dew or rain is on the leaves. A nice sunny afternoon is a desirable time, and then they should have had a hearty meal of some other food before being turned on. They will eat greedily of the rape at first, but afterwards will take several days before they will fill up on it again, and then the danger is past if they have other pasture on which they can feed at will. Further reference to precautionary measures necessary in rape feeding appears in the chapter on 'Feeds and Feeding.'

Before sheep are allowed into any field after July first, where they have not been before that summer, all burrs of any kind or 'pitchforks' should be carefully removed. If permitted to get into the fleece they are unsightly looking, and depreciate the value of the wool.

Culling Out.

The ewe lambs from the best ewes and the best milkers should, if well developed, and promising, be marked at weaning time, and from these the selections should be made to keep in the flock, always being careful to retain those as near the ideal type as possible. They should be liberally fed to insure growth and development, but it is not necessary to feed extravagantly at all. They should not be bred until they pass one year old. If bred when lambs they are retarded in their growth and seldom make as vigorous ewes. Their lambs are often smaller, and not of so much account. The best of these shearling ewes should be selected in the fall to replace those drafted from the ewe flock for any reason. But do not cast out an old good ewe that is also a good breeder and milker for a young ewe unless her teeth have failed or for spoiled udder.

The ewes will now be used in the same way as described for the first year. Those with defective udders or which have proved unthrifty and those that are not good milkers should be drafted and fed with the wether and ewe lambs for market. Their places for this year being filled by purchase.

If the lambs are to be sold in the fall, say October, they will generally give a profit for a small feed of grain each day, yet, if the green feed be plentiful they will usually be fat and heavy enough without any grain.

Before being offered for sale they should be made as presentable as possible, by trimming their tails nicely, as well as all tags, &c., that may detract from their appearance. Some successful shepherds say it pays well to wash them carefully if they be long wools, and probably they are right; it certainly improves their appearance very much. Generally it will be found most profitable to keep the lambs over until March, feeding them well with clover, hay, roots and some grain. At that season they are usually exported either to the United States or to Great Britain, where heavier lambs are desired. In addition to the large gain they will make in weight they usually bring a much better price per pound. If it is desired to establish a special sheep farm, or devote the whole farm to sheep raising it will still be better for the beginner, if without sheep keeping experience, to have only a small flock at first, as already described, and the flock will usually increase as fast as the average man can prepare and accommodate his farm to the special purpose, and furnish suitable housing, yards, &c. Possibly if the farm be not suitable for any other kind of farming, that is, very rough and hilly, he may begin with a larger flock, but even under such conditions, he had better go slowly until he has had a year or two of experience. In any case, to have success with sheep raising, as with any other business, a man's close observation and individuality will play a very large part in his study of others' success and advice which can be only an assistance and not a rule to follow without careful consideration of one's own conditions, and a free use of good judgment.

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TYPES OF MUTTON SHEEP.

Type in mutton sheep and profit in the industry are closely associated and these are greatly influenced by the character of the breeding of the flock. The standard of type or quality is the fitness of the animal for the purpose for which it is raised. Unless the sheep yields a plump carcass of palatable and nourishing mutton and a fleece of wool suitable for the manufacture of high-class fabrics it is a failure and not worthy of the shepherd's care. Unless it can do this economically, or sufficiently so to leave a profit to its feeder, it lacks something that its owner should endeavour to supply in the succeeding crops of lambs.

Fortunately the better the breeding, or the more improved blood a sheep contains, the better carcass it yields and the more economically it is reared and finished for the market. Improvement of breeds has been in the direction of development of the parts of most value on the block together with increase of carcass to live weight and the hastening of maturity. The pure-bred sheep, or the animal that possesses the characteristics of the pure-bred, and these are never found in the common unimproved specimen, is the cheapest to raise, earliest to mature, and sells for the highest price per pound. The advanced mutton raisers recognize this and invariably use the pure-bred sire, knowing it is the profitable course even though the ram costs two or more times as much as even a good grade could be bought for. He knows the improvement he will make is assured and in large measure permanent even to all the generations that follow. With every succeeding improved cross uniform excellence is more firmly established until the flock ceases to give inferior, unprofitable stock. Each ewe is a good mutton sheep and when mated with a strong, pure-bred male, barring accidents, ill-health and bad treatment, she yields a lamb of assured excellence. The type has become fixed and she cannot do otherwise.

How many sheep raisers fail utterly to appreciate this simple, self-evident truth, and how dearly they pay for their backwardness! In every province the grade, and in many cases the scrub sire are still in use. In like proportion are inferior lambs being raised. To learn the causes of the differences in the quality of lambs from different sections the writer visited districts noted for poor, fair and good lambs. Directed by extensive sheep dealers familiar with the several sources of supply, camera in hand, journeys were taken and farms visited. Unfortunately the wildness of some of the most inferior specimens made photography difficult and representatives of a number of run-out flocks seen can not be published. Enough are shown, however, together with the figures representing the weights of shipments to teach the important lessons.

District No. 1, representing wide areas in each of several provinces, turns out a class of lambs of unspeakably poor quality. The weights run in October and November from 50 to 75 pounds, with an average of little more than 60 pounds. They are not only light, but poor, unprofitable specimens, alike to the raiser and the butcher that sells them to the householders. Their legs are long, thighs thin and backs bare, presenting little for the cook to do much with. In the shambles they dress out very light carcasses—not over 45 per cent of their live weight. For this reason the dockage by the drover is heavy, which leaves the grower a very small return for his lamb crop, so small indeed that he doubts whether or not sheep raising is a profitable industry.

The camera yields some of the secrets of the inferior stock. Such a thing as a pure-bred sire is unknown in these districts, and it is difficult to find even a passable grade at the head of the flock. As a rule the most upstanding, lusty lamb of his or his neighbour's unimproved flock is brought into requisition year after year, with the sure result of a run-out, degenerated race. It is in these sections that the black lamb is most common, and he is almost invariably a light weigher wherever found. Figs. 31 and 32 show a ram and group of ewes typical of the stock in district No. 1, while Fig. 33 truly represents the lambs from these.

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Bad breeding is not entirely to blame for the inferior lambs produced. The flocks are little valued and are fed and housed accordingly. In the winter they receive little more than straw, and no matter how bare the pasture becomes in summer no extra food is given. Ticks hold full sway, and the division of the sexes is not thought of until the lambs are shipped out to market. It may be noted that the average clip in many unimproved flocks is not higher than from 4 to 5 pounds per head.

From district No. 2 lambs running from 60 to 90 pounds are produced. Here the value of improved blood and better methods of feeding are beginning to be recognized. The common ram is giving place to the grade, and occasionally a low-priced pure-bred is brought in. With this forward step better feeding and care are naturally exercised, with improving stock as a consequence. Grade sires are being used in this district, which is slowly but surely emerging from primitive methods. Here we find an occasional man growing roots and clover hay for winter feding, while some attention is being given to castration and the general welfare of the stock, with the result that the majority of the lambs surpass the weight limit that entitles them to the top marke price. The flocks shear from 6 pounds to 8 pounds per head, and on the whole the sheep industry is in a prosperous condition.

District No. 3 produces a very good class of lambs, many of which find their way to the Buffalo and New York markets. They are well fleshed; many of them wethers that command the best price in any market. They weigh from 80 to 110 pounds each in October and November, and dress out from 55 to 60 per cent of carcass. The owners here have long since given up the use of grade sires, and many are not afraid of a fairly stiff price for a good ram. While sires of most of the mutton breeds, including the Shropshire, Southdown, Oxford, Leicester, Cotswold and Lincoln, may be found in perhaps only slightly varying proportion, only the photographs of the two breeds, Leicester and Oxford, were secured. Figs. 36 and 37 represent rams in service in grade flocks. Fig. 34 shows a group of grade ewes, while Fig. 35 represents lambs produced by such parentage. In these flocks lambs grading as culls are never found; in fact practically one hundred per cent of the lambs are of first quality, commanding not infrequently a price slightly in advance of the highest published quotations. Even on a glutted market these well bred lambs will sell, as buyers are constantly on the outlook for choice stock.

Many of the grade flocks show the result of changing from long wool to Down sires. Broad backed, massive dams, some with brown, others with speckled or grey faces, are the pride of their owners on many good farms. They shear from 8 to 12 and occasionally 14 pounds of good wool, and when their usefulness in the flock is past they quickly fatten up and sell for a good price. The highest quality of carcass is produced by these ideal mutton sheep. It gives a thick cut of muscle or lean meat, and has sufficient fat to suit the fastidious palate.

Many lessons in shepherding may be learned from the practices of men in these sections. The wants of the sheep are as carefully looked after as those of the cows, and as a rule the former are much the more profitable. Clover hay is the sheep feed generally used, and many grow turnips for the housing season. Mr. Chas. Moore, an enthusiastic sheep raiser, living in the northwestern corner of Carleton county, Ontario, finds great satisfaction in the use of mixed grain unthreshed for wintering his flock. While he used turnips liberally the lambs came soft, and slow to get on their feet, while since the mixed grain diet has been adopted the lambs come strong and able to look after themselves at once. The mixture he favours consists of oats, wheat and barley, and it is harvested on the green side. This with clover hay is the winter diet of Mr. Moore's sheep, and a grand flock they are. No male lambs escape the knife on his farm, which is not the case on too many of the farms of his neighbours. Nor is the long-tailed sheep, that tell-tale of semi-neglect, to be seen there either.

Districts Nos. 1, 2 and 3 are not circumscribed by definite geographical boundaries. The first, as may be inferred, represents the thoroughly backward localities, where the soil is inferior, farmers poor and lacking in enterprise.

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The second occupies a wide and scattered territory, even reaching into good agricultural sections where, unfortunately, second-rate farmers are too often found. As a rule district No. 2 occupies what may be termed the 'back townships' of moderately progressive counties. In this district owing to peculiarly favourable conditions for sheep husbandry many good lambs are raised, but the high percentage of culls renders the average of quality comparatively low. If the losses being sustained year after year through the use of grade sires were fully appreciated the enormous yearly exodus of pure-bred rams to the United States, which is building up the mutton industry of the American farmer, would in large measure be discontinued, because the home field would absorb the good available stock. Such a condition would insure prosperity for the pure-bred as well as the commercial flock master of Canada.

The remaining 'district' occupies the best farming sections, where not only high-class sheep but superior cattle and excellent horses are reared. Farmers here have learned to make the best of their opportunities, and in this they find great profit in the use of the pure-bred male, be he sheep, horse or hog.

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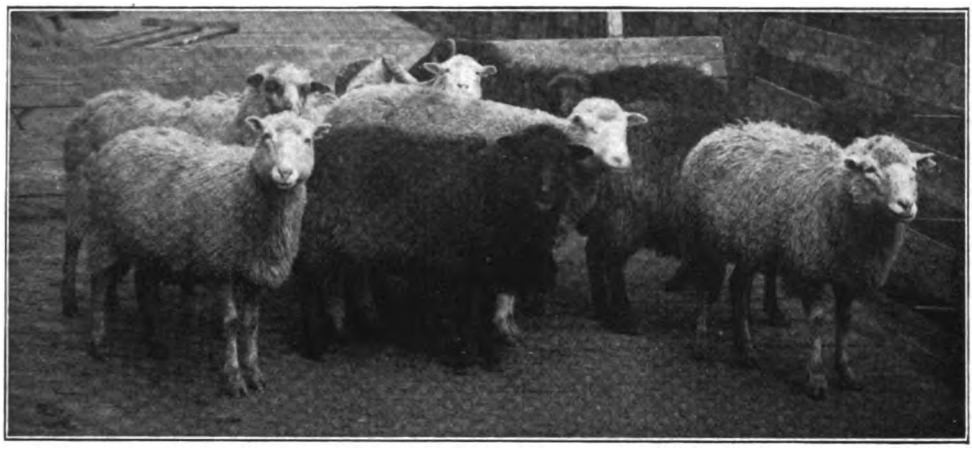

Fig 31.—Group of Scrub Ewes.

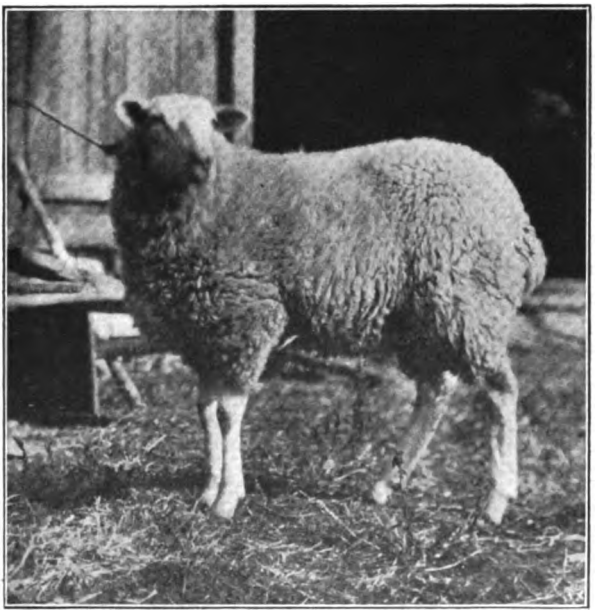

Fig. 32.—Scrub Ram.

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Fig. 33.—Group of Scrub Lambs.

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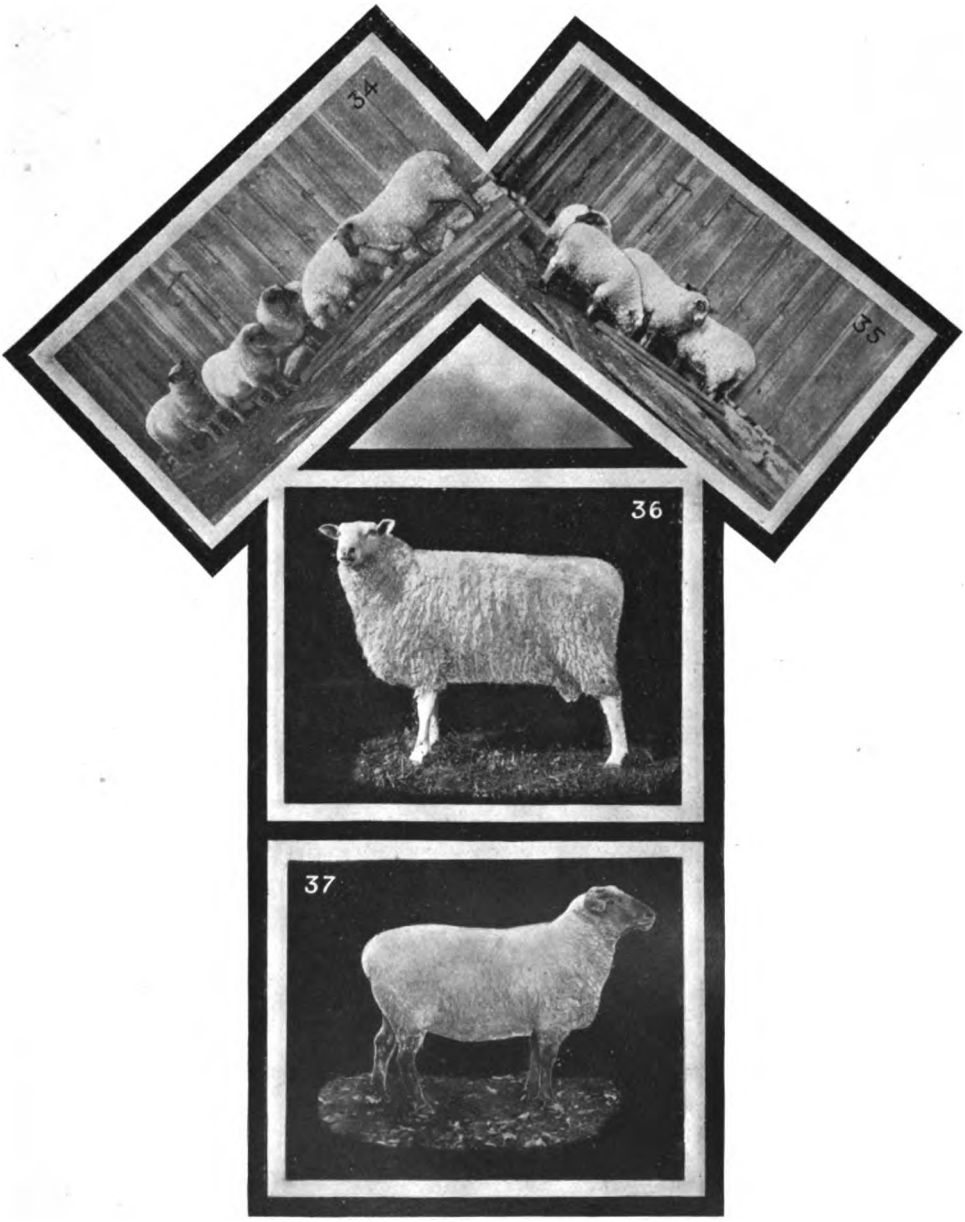

Fig. 34.—Group of Grade Ewes.
" 35.—Group of Grade Lambs.
" 36.—Leicester Ram at Head of Grade Flock.
" 37.—Oxford Ram at Head of Grade Flock.

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MUTTON PRODUCTION IN GREAT BRITAIN.

In Canada the raising of mutton has not received the attention that has been accorded to the production of beef, pork or dairy products. In Great Britain, and to a considerable extent in the United States, commercial mutton raising constitutes an important branch of agriculture. In Canada it is confined chiefly to a limited branch of mixed farming, and as such receives comparatively little attention.

Nowhere is better mutton produced than in Great Britain, and no branch of the live stock industry in the 'Old Land' is more profitable than sheep raising. There it is conducted as a highly specialized industry for the purpose of gaining a livelihood after paying high rents and other heavy expenses.

Both in England and Scotland the flocks of breeding ewes run high up into the hundreds, and each is in charge of an intelligent shepherd trained in many instances from his boyhood in the management of sheep for profit. In many cases one or more under-shepherds are engaged and these men devote their whole time to the tending of the sheep. It is realized that what is worth doing should be well done, and with this idea only the profitable members of the flock are maintained and these are made to yield their best returns. The crop rotation followed is dictated by the needs of the sheep and when food is purchased due consideration is given to securing only the sorts that best suit the purpose for which they are fed. So long has the sheep industry been established in Britain upon an extensive commercial basis the general system of feeding and breeding varies comparatively little and then only as the conditions of the land and environments demand. Everywhere the succulent root is extensively grown, and wherever sheep are reared specially sown pasture grasses are to be found. It is also a rule of the mutton maker to feed 'cake' to his fattening stock, though its purchase demands a heavy expenditure of money. It has been learned that a thrifty condition of the system is of first importance and after that nourishing food. The outdoor life of the stock, together with succulent root and pasture rations, guarantee the health of the sheep, while the generous use of the highly nutritious compressed linseed or cottonseed meal given with other concentrated food is turned to good account in the systems of the animals.

While more or less uniformity characterizes the methods of old country shepherds most flocks have a character of their own. The breeder carries his type of sheep about with him in his mind's eye and it is the impress of the mind of the breeder reduced to palpable form that guides his selection of breeding stock. Defects from a breeding or marketing standpoint are quickly noticed, and such rams as are strong where the ewes are weak are invariably selected for the coming generation. A successful shepherd will not forgive pronounced weak points, as he sees them, and hence his flock will strongly reflect his fancy.

The old established flocks do not vary much in their make up from year to year. The same farm visited at the same season on different years will present about the same appearance so far as the flock is concerned. Ewes that reach a certain age are put into market conditions and disposed of and carefully selected ewe lambs are called in to fill the breach. Haphazard methods find no place on the British sheep farm and definite uniform results are consequently looked for and in large measure realized.

Sheep raising undoubtedly finds its highest development on the farms where pure-bred flocks are reared. Most, if not all of these, are commercial flocks, that is to say, large numbers of sheep are annually fatted and sold to the butcher trade. Only the choice representatives carrying a maximum of breed type and excellence are maintained and perpetuated as pedigreed stock.

The pure-bred flocks of England run from two or three hundred up to one thousand head or more of ewes. This number in addition to quite an extensive stock of cattle and horses is maintained on farms of 450 to 500 acres. The system of herding, very commonly adopted, makes it possible to carry this heavy stock. Such

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crops as rye grass, orchard grass, red clover and sainfoin produce luxuriantly on the rich soil made so by years of intensive sheep culture. Rape, roots, cabbage and the like are also grown for the sheep, and unless at such seasons of the year as rapid gains or development are desired the various branches of the flock are inclosed within the hurdles, receiving in addition to the generous forage a bite of oil cake or other strong ration. During the early summer and again after the lambs are weaned the matrons and perhaps the young ewes usually have their liberty on pasture, but even here much travel is not necessary to secure a belly full. Feed seems abundant everywhere, and it is kept so by frequent changes of run and judicious management in other ways.

After the lambs are weaned they are constantly confined to the hurdles, winter vetches, tall oat grass and clovers almost hiding the youngsters in their lot from that time onward. In addition they receive once or twice daily an allowance of crushed oats and oil cake. The hurdles are moved each day, leaving behind closely cropped ground and taking in an abundance to eat. On many farms the ewes that are pasturing on grass are given access to the plots gone over by the lambs eagerly picking off the stems which they relish by way of change. This constant changing has much to do with the thrift so much in evidence in the average British flock. By taking advantage of this nothing is lost and the ground is again given opportunity to reclothe itself, to be again gone over in the course of a few weeks. To this end successions of crops are sown wherever opportunity offers. Mangels and turnips frequently follow a pasture crop and those come on to be fed off either where they stand in the field or are doled out day by day in troughs during the winter and spring and even well into the summer following. Mangels seem to be almost perpetually on hand on the English sheep farm. They are fed on pasture as well as on dry feed and are highly valued for the variation in the diet and their beneficial influence upon the digestive organization.

In the South of England.

In the south of England much land is devoted to sheep raising. In the Dorset section Dorset ewes are bred twice or three times to Dorset rams and once to a Down ram, after which they are fed to be sold, ewe, lamb and all for the block. In this way the breding flock is kept pure, the ewes are turned off at an age to suit the market, and the half-Down lambs dropped in the early winter command the highest price of the year.

Here the sheep receive full consideration in the farming operations. The rotation is a short one, consisting of wheat, followed by grass and clover to be fed off by sheep. This may lie but one year, part of it being made into hay. Some vetches are grown to be fed green or as hay, and a considerable breadth of turnips are followed by wheat again. Here the sheep are hurdled on the land from which they carry away very little if any fertility. The key-note of the sheep husbandry here, as in other parts of England, is first the hurdle, then the newly sown field, and then the faithful shepherd. In Canada we lack the favourable winter so valuable to the British sheep keeper, but all other conditions are favourable for the highest development of the sheep industry. Perhaps what would be hardest to get is the faithful trained shepherd, who lives for his care and is always looking for the most promising ewe lambs to replenish the flock.

Mutton Making in Scotland.

Commercial mutton raising is a highly developed industry in parts of Scotland. Some sheep farms carry only what is known as a 'flying stock'—that is to say the sheep whether bred on the place or bought in are kept upon the farm for only one year or less. On other farms stocks of ewes of regular ages are maintained. Where the former practice is in vogue, ewes that have raised three crops of lambs are bought in September, and with their lambs are sold fat the next spring or early summer. By many half-bred (Leicester-Cheviot or Leicester-Blackfaced) ewes are preferred, but Oxford Downs and Suffolks are also purchased to turn off. Pure-bred Leicester and

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Oxford rams are generally employed on these ewes. In the autumn lambs also are bought in to consume what turnips and grass there may be available, and to be marketed when fat on in the winter or spring. The practice described is especially adaptable to rich land on which a short crop rotation is the rule. Here the grass land lies only one year, or two at most.

On higher lying or poorer farms that maintain a considerable area of old grass pastures flocks are maintained throughout the year and from year to year. As a rule the ewes are half-breds of the same crosses as already mentioned. These are mated with pure-bred Leicester or pure-bred Oxford rams, or in some cases Hampshires, Suffolks or Shropshires. It is the practice of many to divide the flock into two divisions about equal in number. On the old pasture the half consists of one-third bought in shearlings to have their first crop of lambs, one-third two-year olds and one-third a year older to have their third crop of lambs. The progeny of this half of the sheep stock is mostly kept on for feeding for the market on turnips.

The second half of the ewe stock is made up of first, three-crop ewes that have been transferred from the first to the second half of the stock, in which they form about one-third of the necessary number; and second, double this proportion of ewes of the same age bought in from farmers who dispose of their ewes after their third crop of lambs. These old ewes are bred early in the fall so as to have their fourth crop of lambs ready for the fat market, to which both ewes and lambs are sent.

The feed grown upon the farm consists of grass and turnips. Great care is exercised in seeding to grass. For a single season's pasture a mixture composed of 12 pounds Italian rye grass, 14 pounds of timothy and 10 pounds of red clover is sown per acre. When seeding for a longer period a favourite mixture is 12 pounds Italian rye grass, 6 pounds perennial rye grass, 14 pounds timothy, 4 pounds red clover, 4 pounds alsike, 3 pounds white and 2 pounds trefoil or yellow clover. This seems a heavy seeding, but the Scottish farmer finds such a seeding pays in mutton. It enables a heavy stock to be carried on the land, and the variety provided ensures rapid gains of the sheep and lambs.

The turnip crop is of great importance. For the fall months the white variety known as Greystone is used. When these are eaten off a later sort of green top white comes into use, and by the new year the swedes may be turned upon or fed by hand. To use swedes early is found to be injurious to the lambs, even proving fatal at times.

Flocks Renewed Each Season.

In seasons of good grass about two ewes per acre are purchased in September. These are kept upon grass until bred. A supply of turnips are hauled to the field for a short time before the mating season, which commences about the middle of September, to build them up. It is believed that ewes produce more twins when thriving well at mating time. From 40 to 50 ewes are allowed to each ram.

After the mating time as the winter advances hand feeding is necessary. Turnips are supplied in moderate quantity, about 1,400 pounds being given to 100 ewes. They also receive cotton cake up to a pound each. Near lambing time about a quarter of a pound per head of a mixture of bran and oats is given. In frosty weather the supply of turnips is reduced and hay is liberally fed.

As lambing time approaches the most forward ewes are drawn out to be inclosed in small groups to avoid crowding, and as these are able to leave for the open field others are brought in to take their place.

When the lambs are able to look after themselves they are turned with their mothers into pastures, where hurdles laced with straw are erected for shelter. The most forward lambs are selected for the earliest and best young grass pasture in order to be rushed along to catch the high prices early in the season. All are brought along as rapidly as possible, and disposed of as they are ready.

The treatment of store lambs bought in is interesting. The sales of these commence about the end of July and continue on into the autumn. Care is taken not to over-stock, as rapid gains are desired. These are placed in good pasture, and grain

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feeding is commenced. Oats, bran and cotton cake or oil cake are fed in very moderate quantities at first and gradually increased at the discretion of the shepherd. Large flocks together are avoided, the numbers not exceeding one hundred head. The lots are made up according to size and condition, and disposed of one lot after another as they become fit for market without disturbing the others.

The space given each lot depends upon the length of the field to be fed off and the number of lots; the breadth of each division is usually about fifty yards—the length of hurdle nets employed. In the district referred to wire nets are used for the side divisions and string nets in front, whereas in many parts of England wooden hurdles woven from wands are used.

The amount of attention devoted to the fattening lambs would astonish many Canadian sheep raisers. Every inducement is given the sheep to consume as many turnips as possible, as rapid gains are desired in order to get the stock off to market with the least possible delay. Baskets are filled in the evening to be ready for early feeding in the morning. As early in the morning as light will allow the shepherd feeds in separate boxes as much cotton cake as will be eaten up clean in an hour. At the same time the turnips prepared the previous evening are fed in the proper troughs. Only a few are given the first round in order to get all the lots busy at the troughs. The feeder then comes back to the first lot and leaves as many cut turnips as will cover the bottoms of the troughs two or three inches deep, and continues to serve all the lots in the same manner again and again during the whole day. By this system of frequently supplying freshly cut roots, the sheep are induced to the troughs to partake of more food. At three o'clock in the afternoon a supply of cotton cake is given as in the early morning and in the evening the turnip troughs are filled for the night. A rack of hay is placed in each inclosure and is replenished every afternoon. This daily routine is continued until the sheep are sent fat to the market.

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FATTENING SHEEP IN CANADA.

While a very large percentage of sheep and lambs that are marketed direct from the farms go right off the pasture with no special preparation in the way of fattening, many progressive and thorough sheep raisers fatten their stock as they do their beef cattle and hogs in order to secure the best prices for their product. A finished article is always in demand at a valuation in advance of that sold in leaner condition.

A finished mutton sheep, like the finished bacon hog, is not the heavy over fat animal that was looked for many years ago. Consumers are more delicate in their taste and discriminating in their choice than in the past, and therefore want their mutton or lamb lean, tender and juicy. While this is true, a thin, lean carcass is not a desirable article of diet and therefore should not be sent off the farm unless to be fed in some other man's feed lot until ready for the purpose for which mutton sheep are grown.

Owing to limited supplies of sheep in every province of the Dominion even the lean, skinny specimens will sell, although of course at a lower price per pound than those which kill out plump carcasses. If bred from low-set well-bred stock and are well fed and cared for until the autumn both lambs and older sheep are usually about as fat as the market demands. On account of the natural tenderness of the lambs all the flesh they carry is juicy and well flavoured. If, however, the market is over-stocked and it is desired to hold over until the price has improved, the stock should be put on a fattening diet until finished. The market is usually very good from the middle of February onward, and the stock should be ready to top the market by the time one chooses to sell.

After the lambs are weaned the wethers, and others to be fattened, should have access to a variety of pasture. An old grass field is very useful by way of a change, but an additional plot of aftermath, clover, lucerne or rape or a combination of these will supply an excellent bill of fare. A feed in the morning of oats and bran is not lost on fattening lambs—it will increase the gains and reduce the risks of illness from an over succulent diet. The salt supply should never be allowed to run out at this season particularly when the white frosts appear. An over-feed of salt is dangerous on a succulent diet. Rather than give salt irregularly in the autumn it is safer to withhold it altogether at this season. Indeed many are adopting this latter plan. No drinking water is needed by sheep pasturing on rape or lucerne. Autumn is the natural season for all animals to flesh up, and every advantage should be taken to aid the process. With the advent of frosty nights care must be taken to not only hold the weight made, but to continue the increase as rapidly as possible. The appetites are keen and unless flesh is being deposited each and every day the food that is eaten is lost to the owner. To guard against any check it is well to furnish a morning feed of well saved clover. The lambs will relish it and begin to thrive anew. It is the practice of many cautious feeders, anxious to keep down the mortality to a minimum, to bring up the flock to a grass plot in the evening and have a feed of hay ready when they arrive, or in a separate yard to be turned into the first thing in the morning. It is not a bad practice to provide a feed of grain in the evening and the hay or both in the morning before turning them out for the day. Lambs cared for in this way will put on weight very rapidly. It is remarkable how many sheep can be fattened on a comparatively small area of land sown to the proper crops.

Winter Fattening.

The principle of avoiding extreme changes of diet observed by all careful feeders, should be strictly adhered to when the housing season arrives. The daily feeds of hay and grain for a few weeks before winter seals up the ground and renders pasturing unprovidable is a fine preparation for complete hand feeding. As the rape,

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lucerne or whatever outside crop has been the chief diet fails, roots may be gradually substituted. The hay will have to be increased to all the lambs will clean up twice or three times daily and the grain ration may be gradually augmented as well. The chief thing to aim at is to keep the feeders gaining and thus paying for their diet as they go along.

The selection of a grain ration is a matter depending upon the market and the crops grown at home. It is generally wise to avoid purchasing feed if it can be satisfactorily raised on the farm. In planning the sowing of the different fields of the farm in spring the fattening lambs should be provided for as far as is consistent with the suitability of the soil and other conditions.

Oats are peculiarly suited to sheep feeding. This grain is nourishing and safe to feed; it will go well with other grains, and as a crop is easily grown. Two parts oats, one part peas and one part bran is a good ration for sheep of any class. Corn substituted for the peas answers well. Towards the end of the finishing period the heavy part of the ration may be increased to fully three-quarters by weight. Oil cake is highly valued by many sheep feeders. It may be substituted for the bran, when the proportion of heavy grain should accordingly be diminished. From half a pound to one and one-half pounds of grain per head per day according to the ends to be attained constitutes a fattening ration, when the coarse fodder used is fed liberally and of good quality. The practice of feeders differ with localities. An extensive feeder, Mr. Thos. Shillinglaw, in Huron county, who buys in lambs and sheep to fatten, in some seasons uses rape and grass as the chief ration. Until the housing season arrives no grain is given, but after that date clover hay and grain are fed, and the flock allowed on the rape one hour twice daily until about Christmas or until snow buries the feed. The sheep thrive finely on this diet, and are sold as soon as the rape feeding is finished, as it has been found that satisfactory grains are difficult to secure for some weeks after the rape is done. The grain ration used usually consists of a mixture of oats and peas, oats and corn, and sometimes barley is added. About one pint of grain per head per day in two feeds is the usual rate of feeding. Lambs weighing 90 pounds on October 1st weight about 110 pounds at Christmas. These weights constitute the average of 600 head.

In North York, Mr. Robert Somerville raises and feeds about one hundred ewe and wether lambs. In the fall grass pasture is the chief dependence, but either rape or kale is provided also. When taken from the fields lucerne hay and pulped turnips are liberally fed, and a grain ration of oats and barley or peas is commenced at the rate of one pint per day for each animal in two feeds. The lambs are usually finished in January, when sold, weighing about 120 pounds each. The breeding flock consists of grade Oxford ewes and pure-bred Oxford rams. A further discussion of foods occurs elsewhere in this bulletin.

It is of the first importance that for the well-doing of any class of live stock that the animals be comfortable. Unless proper precautions are taken sheep are almost sure to be more or less infested with ticks, and perhaps the more minute form of vermin-lice, a more irritating insect than the former. To rid sheep of these pests they should be thoroughly dipped with one or other of the reliable commercial preparations, which not only destroy the vermin but clean the skin, reducing irritation and unrest to a minimum.

Feed to a Finish.

Market sheep should not be sold until finished nor should they be fed for a longer period. If a portion of the flock is behind the others in this respect and it is desired to ship out the entire flock at once the leaner ones should be separated out and pushed along more rapidly. One requires some training to be able to judge when a sheep is finished. In well-bred sheep the back is a safe guide, but inferior ones may be bare on the back and still be fairly fat. To examine a sheep for fatness the hand should be laid firmly on the back, palm downwards, and moved from side to side. In a finished sheep the spine is well covered, presenting a cushiony rubbery feel. In addi-

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tion the tail and breast should be examined. In a finished sheep the tail carries considerable plumpness, while an examination of the brisket shows fulness on either side, filling the space between that and the leg. An over-fat sheep carries a considerable depth of fat low down on the fore ribs and a sagging condition on each side of the brisket. The market does not want extremely fat sheep. Fig. 41 shows a cross-section of a finished sheep, Fig. 39 shows a carcass much too fat for the trade, while Fig. 40 shows an unfinished carcass. Fig. 38 shows a group of finished ewes selected on Toronto market by experienced butchers. These ewes weigh from 140 pounds to 155 pounds each.

Spring Market Good.

The practice of selling off the great bulk of lambs in the autumn leaves the market very bare of freshly killed young sheep during the late winter and spring months. The chief source of mutton supply at that season is the frozen carcasses that were stored away at the beginning of winter. Such meat is not the sort to satisfy a high-class trade, so that the price of good yearling mutton is always at a premium at that season.

Fattening on Screenings.

During the past few years sheep and lamb feeding has been carried on quite extensively at grain shipping centres in Canada. At Moosejaw, Sask., Port Arthur, Ont., and other points sheep fattening has become an important industry. At these places very large quantities of elevator screenings, consisting of broken and small wheat, weed seeds and short pieces of straw, are cleaned out of the wheat prior to reshipping. The value of this material as food for fattening sheep and lambs is very high, producing rapid gains in weight and mutton of excellent quality.

Previous to the fall of 1905 large quantities of screenings were annually exported from Fort William and Port Arthur to feeding yards in Minnesota, but since then this by-product has been fed at Port Arthur. The transactions of the season 1905-6 and 1906-7 proved highly profitable alike to the elevator people and the sheep feeders. The screenings were marketed at a good valuation, stated to be about $10 to $12 per ton. Lambs weighing from 50 to 60 pounds were purchased at Alberta ranges. The first season 4,000 head were secured from $2 to $2.50 per head, but in the fall of 1906 fully 10,000 head were handled. The demand by this time created by feeding operators increased the price a dollar or more per head.

The feeding period lasted about one hundred days, when the lambs were turned off without their fleeces weighing from 90 to nearly 100 pounds each. They were marketed chiefly at Winnipeg and Toronto at values up to $7.25 per cwt.

The sheep were inclosed in open yards surrounded by sheds with only back and roof. In the yards were racks for hay and large roofed self-feeding hoppers kept constantly supplied with screenings. The lambs were shorn in March, after which they made very rapid gains until sold between April 15 and a month later.

At Moosejaw the feeding industry is conducted on a somewhat less extensive scale. Whereas at Port Arthur the feeding is done in open yards, at Moosejaw closed pens are employed, but are left sufficiently open for good ventilation. The pens are not floored. The internal equipment is about the same as at Port Arthur, embracing self-feeders and a constant supply of good water.

In addition to lambs of a character similar to those fed at Port Arthur, a large number of wethers from one to two years old and ewes of various ages have been fattened at Moosejaw.

To look after some 3,000 head three men were employed—two to do the feeding and keep the sheds in order, and one to look after the business of keeping on hand a stock of feed and marketing the finished sheep. The sheep were shorn here as at Port Arthur in March and marketed between the middle of April and the middle of May. Most of the stock was sold to local butchers, weighing about 124 pounds per head. As high as $7 per cwt. was received for much of the stock.

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The feeding transactions carried on at Port Arthur and Moosejaw have been highly profitable to the operators and of great benefit to the sheep raising industry of the west. It is the opening up of a new and extensive outlet for range stock too thin for the best markets, but which when fattened is of excellent quality, commanding a high figure and greatly increasing the demand for and consumption of mutton.

The information that has been secured by the feeding of sheep at Moosejaw, Port Arthur, and other points, upon screenings and refuse grains has been the means of placing the sheep raising industry of western Canada upon a much higher plane than it has hitherto occupied. It is now realized that as a means of converting thousands of tons of the seeds of noxious weeds into a highly valuable product sheep occupy first position. While they are doing this they are building up a mutton trade that cannot fail to be of growing importance to, first the sheep raiser and second the country at large. A new era has dawned for the sheep industry of the prairie provinces of Canada.

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Fig. 38—Group of finished Ewes.

Fig. 39—Cross Sections of a Carcass much too fat.

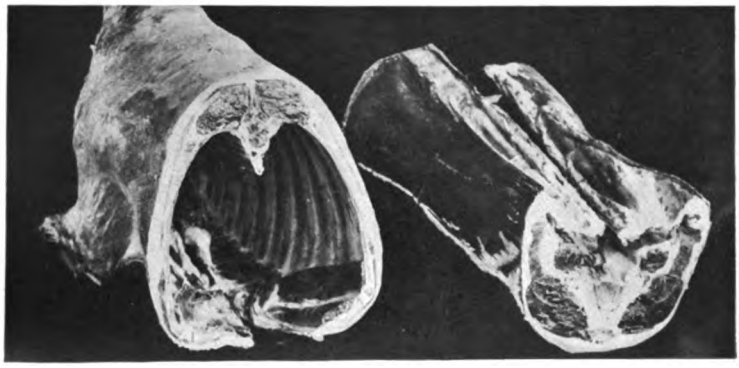

Fig. 40—Cross Sections of a Carcass too thin for the Trade.

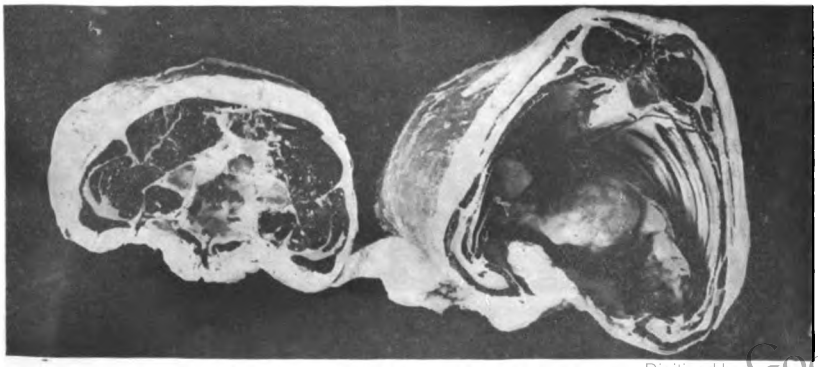

Fig. 41—Cross Sections of a Finished Carcass.

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FROM THE BLOCK TO THE TABLE.

While mutton is one of the most healthful of meat foods produced upon the farm, it is not as popular as beef or pork with the average Canadian family. In Britain and other countries where sheep of the mutton breeds are intelligently reared and fattened, and the meat properly prepared, this class of flesh holds its place with the other staple sorts that enter into the daily consumption of the people. In countries where wool production is the chief consideration of the sheep raiser mutton is not a desirable food, because the quality of the flesh is of a low order, lacking in desirable flavour and texture. It is only in recent years that mutton joints have won a place on the menu cards of the best restaurants in United States cities. Until the American sheep grower introduced the mutton breeds and finished the product of his flocks as he did his cattle and his hogs before marketing, mutton was an unpopular food in the United States. A score or more years ago, eight-cent lambs and six-cent yearlings were not sought by the trade as is frequently the case now. Mutton may be palatable and nourishing or, on the other hand, a tough, woolly-tasting product, according to the method of its production and preparation. No other class of meat is so subject to improvement as mutton. In recent years the general marketing of sheep before one-year old has increased mutton consumption in Canada many fold. This is more particularly true in towns and cities that have the advantage of discriminating markets and well conducted abbatoirs. Butchers that secure their stock of mutton from these sources are able to offer their customers mutton of a quality that appeals to a refined and discriminating taste.

The development of the industry from the standpoint of the consuming trade, in so far as it comes into contact with the influence of the modern abbatoir and trained butcher, is making satisfactory progress. This is indicated by the improving prices paid for finished mutton. It is on the farm—the source of the mutton supply—that the consumption of this nutritious, healthful product stands in need of development. No other class of animal so readily lends itself to the demands of a rural household for a supply of fresh meat as a young sheep. It is of the highest importance that it be in good killing condition and that the butchering and curing be promptly and properly executed.

The Butcher's Animal.

First-class meat cannot be obtained from animals that are poor in flesh. A reasonable amount of fat must be present to give juiciness and flavour to the flesh, and the fatter an animal is, within reasonable limits, the better will be the meat. 'Never kill an animal that is losing flesh,' is a maxim followed by butchers, and observation points to a logical reason for the saying. With an animal failing in flesh the muscle fibres are shrinking in volume, and contain correspondingly less water. As a consequence the meat is tougher and dryer. When an animal is gaining in flesh the opposite condition obtains, and a better quality of meat is the result. Also a better product will be obtained from an animal in only medium flesh, but gaining rapidly, than from a very fat animal that is at a standstill or losing in flesh.

Quality in meat is largely dependent on the health and condition of the animals slaughtered, and yet the best quality of meat is rarely, if ever, obtained from poorly-bred stock. The desired 'marbling,' or admixture of fat and lean, is never of the best in scrub stock, nor does the highly fitted show animal furnish the ideal in a carcass of meat. There seems to be a connection between a smooth, even, and deeply fleshed animal and nicely marbled meat that is not easily explained.

Age affects the flavour and texture of the meat to quite an extent. While it is not possible to state the age at which an animal will be best for meat, it is a well-known fact that meat from old animals is more likely to be tough than that from young ones. The flesh of very young animals frequently lacks flavour, and is

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watery. An old animal properly fattened and in good health would be preferable to a young one in poor condition.

Preparation for Killing.

It is important that sheep intended for slaughter should be kept off feed from twenty-four to thirty-six hours. If kept on full feed the system is gorged, and the blood, loaded with assimilated nutrients which are driven to the extremities of the capillaries. In such a condition it is impossible to thoroughly drain out the veins when the animal is bled, and a reddish coloured, unattractive carcass will be the result. Food in the stomach decomposes very rapidly after slaughter, and when the dressing is slow the gases generated often flavour the meat. This is frequently the source of the 'woolly' flavour in mutton to which most people express a pronounced dislike. Water should be given freely up to the time of slaughter, as it keeps the temperature normal and helps to wash the effete matter out of the system, resulting in a nicely coloured and good flavoured carcass.

The care of animals previous to slaughter has considerable effect on the keeping qualities of the meat. It is highly important that they be not excited in any way sufficiently to raise the temperature of the body. Excitement prevents proper drainage of blood vessels, and may cause souring of the meat very soon after dressing. In no instance should an animal be killed immediately after a long drive or after a rapid run about the pasture. If heated by such cause it is far better to allow it to rest overnight before killing than to risk the meat spoiling. It is also essential that the animal be carefully handled so as not to bruise the body. Bruises cause blood to settle in that portion of the body affected, presenting an uninviting appearance, and often cause the loss of a considerable portion of the carcass. A thirty-six hour fast, plenty of water, careful handling, and rest before slaughtering are all important in securing meat in the best condition for use, either fresh or for curing purposes.

Only simply butchering appliances are necessary. A proper sticking knife, a skinning knife, a small hoisting pulley, a supply of skewers and a small number of home-made backsets and gambrel sticks complete the outfit for farm sheep killing.

Avoiding the Woolly Flavour.

As already indicated, much of the sheepy flavour of mutton comes from the generation of gases in the stomach after the sheep is killed. For this reason, in addition to proper fasting, it should be dressed as rapidly as possible. A platform 6 or 8 inches high is convenient to work on, and aids in keeping the carcass clean. A clean, dry place is necessary for neat work. Water or blood on the wool makes it very difficult to dress the animal nicely.

If the sheep is an old one, it may be stunned before bleeding. If a young one, the same purpose is served by dislocating the neck after cutting the throat. This is accomplished by putting one hand on the top of the head and the other hand under the chin, giving a shart twist upward. Lay the sheep on its side on the platform, with its head hanging over the end. Grasp the chin in the left hand and stick a knife through the neck, just back of the jaw. The cutting edge of the knife should be turned toward the spinal column and the flesh cut to the bone. In this way it is possible to avoid cutting the windpipe.

Skinning and Dressing.

In skinning, split the skin up the back of the front legs from the dew claws to a little above the knees. Open the skin over the windpipe from brisket to chin, starting it slightly on the sides of the neck. Split the skin over the back of the hind legs to the middle line and skin the buttock. The skin should also be raised over the cod and flanks. Skin around the hocks and down to the hoofs, cutting off the hind feet at the fetlock joints. Run the knife between the cords and bone on the back of the shins, and tie the legs together just above the hock until after the carcass is hung up. Hang the sheep up by the hind legs and split the skin along the under middle line. Start at the

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brisket to 'fist off' the skin. This is done by grasping the edge of the pelt firmly in one hand, pulling it up tightly and working the other with fist closed between the pelt and the body. The 'fisting off' should be downward over the fore-quarters and upward and backward over the hind-quarters and legs. It is unwise to pull down on the skin over the hind legs, as the membrane covering the flesh is sure to be ruptured and an unsightly appearance given to the carcass. The wool should always be held away from the flesh for the sake of cleanliness. The skin on the legs should be pulled away from the body rather than toward it, in order to preserve the covering of the meat. When the pelt has been loosened over the sides and back it should be stripped down over the neck and cut off close to the ears. The head may then be removed without being skinned by cutting through the neck joint.

Begin removing the entrails by cutting around the rectum and allowing it to drop down inside. Do not split the pelvis. Open down the belly line from the cod to the breast bone and take out the paunch and intestines, leaving the liver attached to the carcass. If the mutton is for home use split the breast bone and remove the heart, lungs and diaphragm together. Reach up into the pelvis and pull out the bladder. Wipe all blood and dirt from the carcass with a coarse cloth wrung nearly dry from hot water. Double up the front legs and slip the little cord, found by cutting into the fleshy part of the forearm, over the ankle joints.

Cooling and Cutting.

It is very important that the carcass be cooled soon after slaughtering, and yet that it be not allowed to freeze. The most desirable temperature for cooling meat is 34° to 40°, and an approach to these temperatures will give good results.

In the summer season it is best to dress the animal in the evening, leaving the carcass in the open air over night and carrying it to a cool, dark cellar before the flies are out in the morning. Very often a cool room in the barn can be used for the purpose if made dark. There should be no fresh paint, tar, kerosene, or like substance around, however, as freshly killed meat absorbs such flavours readily. Cooling is often hastened by splitting the carcass into halves or even into smaller pieces. It is best, however, not to divide the carcass until the meat is firmly set unless absolutely necessary to prevent it from souring. For the best results in cooling meat, the air should be dry, as well as cool, and free circulation aids greatly in carrying away foul odors and mould spores. It is also important that flies and insects be kept away from the meat.

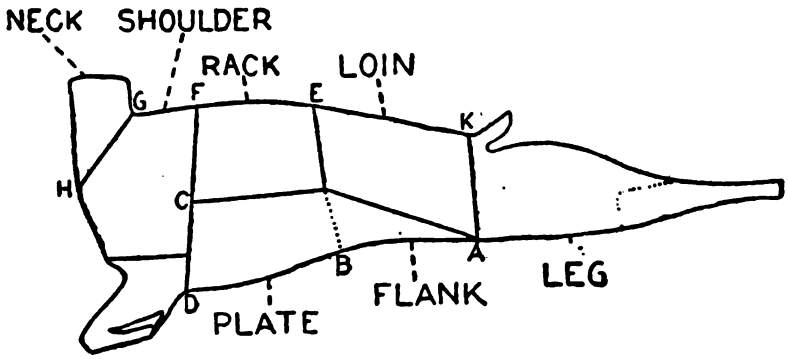

Fig. 42.—Diagram showing Method of Cutting up a Carcass of Mutton.

To do neat work in cutting up meat one should have a short curved knife (a skinning knife is as good as any), a meat saw, and an 8-inch cleaver. An axe may take the place of the cleaver, but is not nearly so useful. If a cross section of a large log can be had it will answer for a block. A table, however, can be used in most cases.

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In cutting one should always cut across the grain of the meat. Following this principle will result in uniform pieces and the joints will be more easily carved after cooking. Cut to the bone with the knife, and use a saw rather than an axe for cutting the bone.

First split the carcass into halves, then cut off the flank and breast, following the line A, B, C, D, in Fig. 42. Cut off the leg at the top of the round, A to K, just touching the hip joint. Remove the shank below the fleshy part of the leg. Cut off the shoulder between the third and fourth ribs and the neck at the shoulder vein. Remove the front shank at the elbow joint. When a 'saddle of mutton' is wanted, one must deviate from this method of cutting and cut the saddle in one piece before the carcass is split into halves. The leg of mutton is sometimes cut into steak, but is usually roasted whole or boiled. The loin may be used for chops, the slice being cut parallel to the ribs, or it may be roasted if desired. The chops should be cut 'one rib' thick. If used as an oven roast the joints in the backbone should be cracked with a cleaver to admit of easy carving at the table. The rack is used in the same way as the loin. The joints in the back of the shoulder should be cracked and the ribs broken across the middle on the inside, when it may be used as an oven roast from a young mutton, or as a boiling piece if from an old one. The breast and flank, when trimmed, are used for stews; the neck and shank for soup stock.

Keeping the Meat.

Cold storage mutton used while fresh is more nutritious and palatable than salted or cured meats. It is, therefore, desirable to use as much of it uncured as possible. It is very difficult to keep meat fresh during the summer months without the use of ice, and even then but little can be handled at one time on the ordinary farm. Where a room or family refrigerator can be kept at a temperature of 40° or less, with good ventilation and circulation of air, fresh meat can be kept for ten days or longer. It is very important that the circulation be free and the air dry. Moisture in a refrigerator tends to develop wet mold or slime, and a little decay soon contaminates the whole piece. Less difficulty will be experienced in keeping fresh meat if it is kept in a room where the temperature is relatively high and the air dry than where the temperature is low and the air damp.

Where an ice-house is filled each year a small portion of it may be partitioned as a cold-storage room. With the ice properly packed on three sides of it, and with good drainage, this makes a very satisfactory place for keeping meat, and it may also be used for storing butter and other perishable products.

Mutton is kept during the cold season by freezing. A carcass is cut up into quarters, or even smaller pieces, and hung in an outbuilding, where it will remain frozen solid. When a portion is wanted it may be cut off with a saw. If the meat is taken into a cold room and slowly thawed out the flavour is only slightly injured. No more should be taken in at one time than is wanted for immediate use. Repeated freezing and thawing are injurious to the flavour and quality of the meat; hence the importance of keeping it where the temperature will remain sufficiently low to prevent thawing.

Packing in snow is a satisfactory way of keeping meat. The carcass should be cut into chops, roasts and boiling meat. All trimming for table use should be done before allowing the meat to freeze. Lay each piece out to freeze separately, where it will not come in contact with other meat. Secure a box large enough to hold it all, and put a layer of dry snow at the bottom. When the meat is frozen put in a layer, packing it so that no two pieces touch. Cover this with a layer of snow and lay alternate layers of snow and meat until the box is filled. Set the box in an outside shed where it will not be subject to sudden changes of temperature. For convenience in getting the meat when wanted, it is well to pack the steaks in one section or end of the box and the roasts and stews in others. It will not then be necessary to disturb anything but the piece desired when a supply is needed. Use only dry snow

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in packing; be sure the meat is frozen solid, it can then be kept through the winter unless there is a very mild spell.

Maturing and Curing.

Lamb does not improve by keeping after the carcass has become thoroughly cool and firm. It requires no maturing to give tenderness, and long keeping tends to lose the delicate 'lamb' flavour. Mutton, on the other hand, to be in best condition should be 'matured on the hooks' for a few days to a week or longer according to the available temperature. Well hung mutton is more tender and of better flavour than when it is eaten freshly killed. It is probably at its best at the end of from ten to fifteen days' storage in a dry atmosphere at a temperature of 40 to 45 degrees.

Without access to a satisfactory cold storage it is necessary to cure parts of the carcass in order to avoid loss or monotony of diet. Corned mutton is very good, and mutton hams are delicious.

No kind of meat should be cooked before the animal heat has all passed off and the flesh has become firm. A failure to recognize this requirement is responsible for much of the dislike for mutton in rural districts. Years ago, before the days of the 'beef ring' and the peddling butcher, when every farm had its quota of sheep, the preparation for any sort of bee, such as sawing or threshing, included the killing of a sheep for the midday meal. The forehanded host usually fasted his subject, and did his butchering the evening before, but too often the former was entirely neglected and the latter overlooked until the morning of the busy day. The writer has witnessed the head of the farm, with the aid of a boy, pursuing the victim knife in hand at nine in the morning of the day the mutton was to be eaten. Was mutton a popular meat with the threshing gangs on those days? Before the end of the season many an innocent sheep was slyly stoned or dogged by a threshing hand, who until this day thinks of mutton only with disgust.

Corning Mutton.

Mutton may be successfully corned by a number of methods. Mutton may be kept sweet several weeks by simply rubbing well with dry salt and closely covering. The pieces should be turned whenever the vessel is uncovered. Following are three reliable receipts for corning mutton by the use of pickle:—

1. Make a brine strong enough to carry a potato about half out. To the proportion of half a barrel add one-half pound saltpetre, if pure less is needed. In ten to twelve days the curing will be complete. When cured it may be kept in a clean new weak brine.

2. To every 4 gallons of water allow 2 pounds brown sugar and 6 pounds salt; boil about twenty minutes, taking off the scum; the next day pour it on the meat packed in the pickling tub; pour off the brine, boil and skim every two months, adding 3 ounces brown cane sugar and ½ pound common salt. Sprinkle the meat with salt before turning the pickle over it. Let it entirely cover the meat; add 4 ounces saltpetre.

3. Prepare a brine by adding to each gallon of cold water one quart of rock salt, one ounce saltpetre and four ounces brown sugar. As long as the salt remains undissolved the meat will be sweet. If scum rises scald the liquid and skim well, adding more salt, saltpetre and sugar. Each piece of mutton should be well rubbed with salt before being placed in the brine. If the weather is hot the meat should be gashed to the bone and salt rubbed in. The meat should be kept immersed in the pickle by means of a weight. A canvas lid kept on the vessel is commendable, as it admits air and excludes flies.

Spiced Mutton Hams.

Mutton hams are easily cured. As mutton takes salt very readily care must be taken not to get the hams over-salt. Select the 'leg of mutton,' and cut off the leg at

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the hock. Some prefer to remove the entire bone. The curing treatment is as follows:—

Sprinkle and rub in a teaspoonful of saltpetre; rub on two teaspoonfuls equal parts ground allspice and cloves; then rub on brown sugar, about a teacup, then apply salt. Turn and rub with application every second day for three or four weeks. Meat thus cured is delicious boiled, or sliced and fried.

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Fig. 43.—Catching a Sheep.
" 44.—Throwing a Sheep.
" 45.—Leading a Sheep.

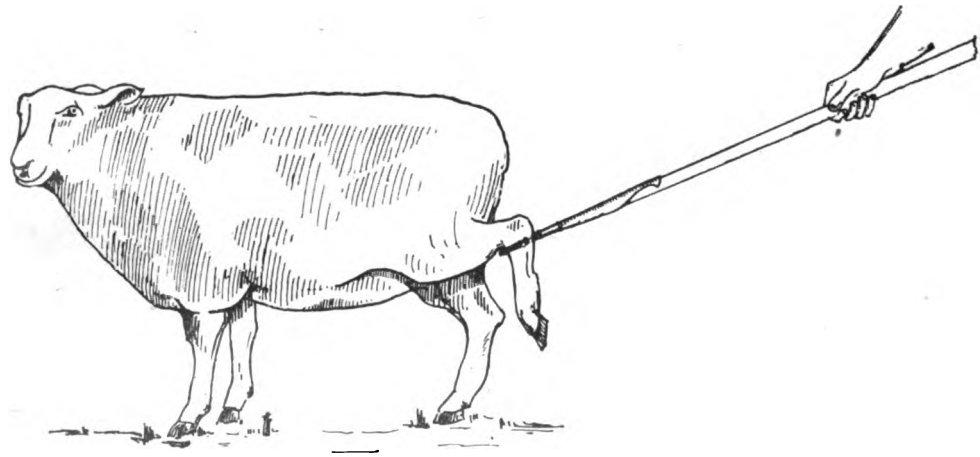

Fig. 46.—Catching a Sheep with a Shepherd's Crook.

Fig. 47.—Shepherd's Crook.

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HANDLING SHEEP.

It is remarkable how few sheep raisers understand how to properly catch and handle their stock. The old shepherd's crook, so humane and useful in the years that are past, is no longer to be seen on more than a very few Canadian sheep farms. In many British flocks the crook still has its place, and with this and the intelligent dog the sheep are driven, caught and handled with comfort and facility for both man and beast.

To the sheep man it is painful to witness the rough, even brutal, usage accorded the gentle, timid sheep on many mutton raising farms. Apart from the pure-bred flocks that are waited upon and cared for with the same gentle consideration as the family horse and the favourite cow, many of the sheep flocks are rushed and driven, grabbed and dragged in the most inhuman sort of way. When the flock is to be divided or an individual separated from the others the bunch is usually rushed into a corner and the victims, one by one, grabbed by the wool and hauled struggling and kicking to the point of exit. To many sheep raisers and farm hands the wool appears to be a natural handle. If the torture inflicted by catching a sheep by the wool could be appreciated doubtless many would seek a better method. The examination of a carcass of a newly killed sheep that has been lifted by its wool reveals an inflamed and congested area resembling the effects of a severe jam or bruise at every point over which the wool was pulled, due to the rupturing of the tiny blood vessels and creating a soreness that must of necessity cause a stagnation in gain if not an actual loss of weight. Apart from this, if the animal is immediately slaughtered the carcass is injured in a greater or less degree according to the roughness accorded the animal.

The proper method of catching a sheep is by the hind leg or the head. If in a close pen in which the sheep are closely crowded it is an easy matter to secure the selected animal by the head, holding it fast until the others have moved away, clearing an avenue by which it may be taken. In a larger pen or yard a sheep should be caught by the hind leg just above the hock or gambrel joint, as shown in Fig. 43. A properly made shepherd's crook is of great assistance in this. The hook (Fig. 47), which usually has a handle six or more feet long, can be extended forward without approaching the sheep sufficiently closely to cause it to plunge to make its escape. When caught by the hock joint it is drawn back until it is easily grasped by the neck. When a sheep is caught in this way the flock is not frightened, as is the case when one rushes in to grasp a member.

To convey a sheep after it is caught the shepherd should place his left hand beneath the lower jaw. If the animal plunges it may be gently grasped by the wool on the farther cheek. The right hand should grasp the side of the tail or the end of the stub. In this position a sheep will almost invariably walk forward at the will of the person in charge. A sheep handled in this way (Fig. 45) is neither injured nor frightened, and is conveyed in comparative comfort for itself and the shepherd.

Much cruelty is exercised in hauling sheep from place to place. More especially is this the case when being taken to market. Few except owners of pure-bred flocks have on their farms a properly equipped sheep wagon. The result is that when sheep have to be hauled their legs are probably tied and they are tumbled into a wagon or sleigh and jolted along to their destination. The discomfort and bruising thus effected is nothing short of severe, and quite unnecessary cruelty.

Sheep should travel on their feet even when being hauled. A wagon to haul sheep should have slatted sides sufficiently high to prevent their jumping out, or boards, if necessary, may be laid on the top, forming a cover to the wagon. The writer for many years used a wagon rack about 14 feet long and as wide as a wagon box, the sides and ends of which were slatted and about three feet high. The end gates were fastened to the sides and the floor by rods—one at each corner of the wagon—passing from the top to the bottom and having threaded thumb nuts. The end pieces swung open forming convenient gates for loading and unloading. This rack

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was used upon the home and many neighbouring farms for hauling sheep and hogs and occasionally young cattle.

To load a sheep it is not necessary to lift it by the wool. Loading should be done by two persons, one on each side of the animal. The left hand of one is grasped by the right of the other beneath the chest of the sheep, preferably between the fore-legs. The other pair of hands are similarly grasped beneath the flanks. In this position the sheep is easily raised and loaded without plunging or injury.

DIPPING.

A sheep-raising farm that has not a properly arranged dipping tank or other means of treating the flock to fight skin parasites is not equipped as it should be for getting the most out of the industry. All sheep are liable to have ticks and lice and

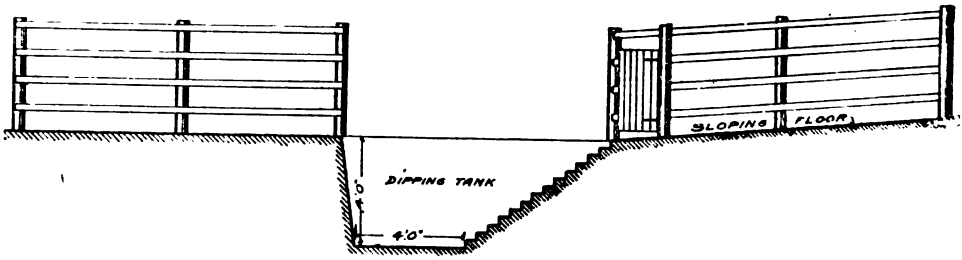

Fig. 48.—Cross section of dipping Tank and Pens.

there also is the risk of getting scab with every railway journey taken by the sheep or the introduction of fresh stock. One or two scab insects may easily spread the disease over a whole flock, causing no end of worry, trouble and financial loss. For this reason the dipping vat should be brought into requisition with every new arrival, in addition to a thorough dipping of the whole flock, which should be done at least twice a year. This is a method of prevention that is worth much more than a remedy after the trouble has been introduced.

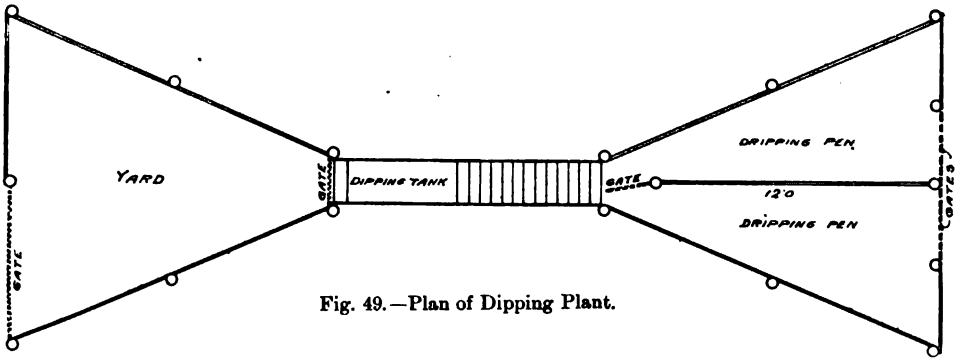

Fig. 49.—Plan of Dipping Plant.

While comparatively few Canadian sheep breeders are familiar with scab there are practically none who could not identify the tick. The louse is a less well known insect, and being very inconspicuous it may cause much worry and loss of weight in the flock without being detected. Thorough dipping with a recognized insecticidal preparation is an easy and inexpensive method of destroying both of these pests and may also cure an incipient attack of scab.

The usual dipping vat is a simple form of trough of concrete, metal or wood, about 16 inches wide and 4 feet deep (see Fig. 50). With a tank of this description the sheep can be plunged so that no part will escape a wetting. They may be dropped or forced to leap into the liquid at one end and allowed to walk out at the other. The entrance end should, therefore, be perpendicular and the other sloping with slatted floor. For a small flock the bottom level need not be more than four feet long,

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with the slatted incline beginning there and running gradually out to a draining platform from which the drip should be collected to be again used in the vat. To economize liquid the vat may narrow to eight inches at the bottom. The fleece will hold enough of the liquid, if of proper strength, to kill the lice and ticks, but if scab is present or feared the sheep should be immersed for fully two minutes, and the head

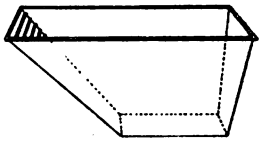

Fig. 50.—Outline of Metal Dipping Tank.

should be plunged two or three times. If time is less valuable than dip, comparatively speaking, it may pay to squeeze the liquid out of the fleece by hand upon the draining platform. Another plan of saving time and dip is to divide the draining platform into two pens, each to be alternately filled with the dipped animals. This arrangement allows the dripping sheep to remain in one pen while the other is being filled from the dipping tank and vice versa. Fig. 49 illustrates the divided draining pen.

A warm dip penetrates better than a cold one and is therefore to be preferred. A temperature of from 106 to 110 degrees Fahr. is about right. When coal tar dips are used soft water should be employed, or otherwise a little concentrated lye added to give the dip a soapy feel. The dip should be prepared to the full strength recommended by the manufacturer. For heating water for dip an open kettle such as is usually found upon every farm is useful. For reheating red hot irons may be thrown into the tank of dip. The plunging of the sheep is facilitated by having a sloping board just at the entrance of the tank. This should be kept greased so that the sheep will slide in readily.

While dipping may be done at any season it should, if possible, be avoided in very cold weather for obvious reasons. If it has to be done in winter the sheep should be comfortably housed until quite dry. The most favourable time for the one chief bath of the year is a week or so after shearing time. The ticks will have largely taken refuge in the lambs, and all should go through the tub. At this time comparatively little material is needed. It is well to retain the clipped members in the liquid a minute or more, as the wool is too short to hold the dip long enough to make a sure job of all the insects. It is important to repeat the dipping in ten days in order to destroy the new arrivals that have hatched during the interval. The flock should again be treated in the fall so as to go into the winter free and unmolested by parasites.

For a small flock a simple trough may be made to answer. The writer has dipped and treated hundreds of sheep, big and little, in an ordinary wooden trough 5 feet 6 inches long, about 20 inches deep, 20 inches wide at the bottom and 24 at the top. The same trough was used for scalding hogs. Lambs were held by the legs and head and plunged beneath the liquid back downwards, lifted out and allowed to drain. Larger sheep were treated on a platform by parting the fleece at intervals of about two inches and pouring the dip from a spouted vessel. The lower parts, including the breast, neck and belly should be treated first with the animal resting on its side or rump. The sides and back are then done with the sheep in a standing position. This method of dipping is slow and laborious, but it may be employed in the absence of a proper dipping tank. The dipping tank used at the Central Experimental Farm, Ottawa, for dipping sheep and swine is 34 inches deep, 30 inches wide, 10 feet 2 inches long at the top and 6 feet 5 inches at the bottom, plenty large enough for the largest hog or sheep or even calves. It is constructed of two-inch pine plank, tongued and grooved, and held together by bolts running through the centre of the plank up and down the sides and across the bottom. In building a plank tank the grooves or seams should be moistened with hot tar or red lead, and special care should be taken to make the construction tight.

Figs. 48, 49 and 50 show cross-section and plan of a dipping tank with necessary collecting yard and dipping pens, as well as a view of a suitable tank or vat.

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THE GREAT NEGLECT.

When asked 'what is the most prominent defect in the sheep-raising industry of Canada?' nine out of ten of the most extensive buyers for the trade will promptly answer, 'the neglect of farmers to castrate the ram lambs.'

Apart from the lambs raised on the ranches, fully seventy-five per cent of the males are marketed as rams. This is the estimate of Toronto market operators, while Montreal firms find even a larger percentage of unaltered lambs in their consignments.

Further east, the practice of castration is still less in vogue until, in the province of Nova Scotia, it is claimed that wethers are practically unknown in this generation, while on Prince Edward Island, comparatively few castrate their lambs. In this latter province it is estimated that, owing to a reduction of one cent per pound paid for ram lambs, and the loss of weight due to lack of thrift in the fall, the farmers of the Island forfeited more than two thousand dollars in 1907.

It is difficult to understand that an operation so easily performed, and which means so much to the sheep trade, and therefore to the sheep grower, should be so generally neglected. To neglect cattle and hogs is an oversight condemned wherever observed, but for some reason the emasculation of sheep is looked upon as a matter of no importance. And yet the dealers who meet the raisers on the one hand, and the consuming trade on the other, pronounce the custom as the chief defect of the mutton-raising industry.

Is it because the entire crop of lambs comes about the same season, rendering the surgical task too ponderous to be undertaken, or is it because of the fear of fatality, or again has the habit of neglect of this important duty become hopelessly established? The condition exists, and in the interest of the industry should be overcome.

In the autumn one has only to visit a flock of mixed sexes to see one of the chief evils. A general restlessness of the flock is observed, continuously day after day, from morning till night. Not only do the males neglect proper feeding, but the others are molested and bothered, until the rapid gains expected with good fodder and cool weather is made impossible. The rams not only fail to gain but actually lose flesh put on at an earlier period. Even though the males are kept separate from the others of the flock, the restlessness continues, with the same unprofitable result. The condition depicted is familiar to many a sheep raiser, who year by year has witnessed the same state of affairs. He has become accustomed to the unrest that possesses the flock within his fields each autumn, commencing with the advent of white frosts. Even in the summer he realizes what will happen later on, but he knows nothing of the peace and prosperity of the wether flock of his neighbour a few farms away. As the date upon which the buyer usually appears comes round, he watches eagerly for his visit, and as soon as the bargain is consummated he urges that his lambs be lifted with the first shipment. He knows the rams will run down from that time on, and the sooner they are weighed out the earlier will peace reign in his flock. He has, however, opportunity of learning even more strikingly his disadvantage when shipping day arrives. His lambs go out on an average of perhaps 75 to 80 pounds, while his neighbours' wethers about the same age turn the scale at from 90 to 95 pounds each, for which he receives a better price per pound. To the evils attending the keeping about of a batch of fertile males already referred to, there is also the serious risk of a number of the best ewes, as well as lambs that should not be bred until a year later, getting in lamb to perhaps the meanest scrub in the flock.

Again, the keeping entire of the males renders it practically impossible to hold them over until winter or spring, when the prices are always better. They are largely responsible for the glutted condition of the market in the autumn months, and they have to be disposed of in the midst of the over-supply. To keep them even to December is expensive, because of the unsatisfactory gains they make, but apart from

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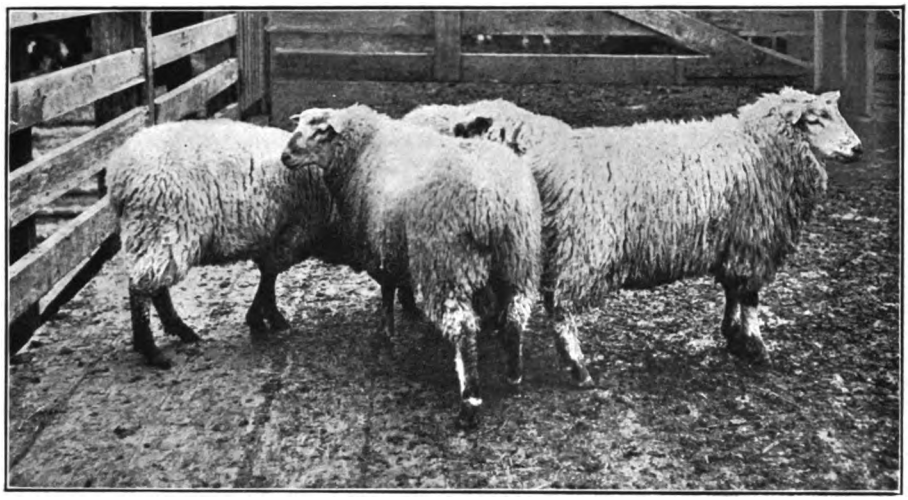

Fig. 51.—Ram Lambs, marketed as culls.

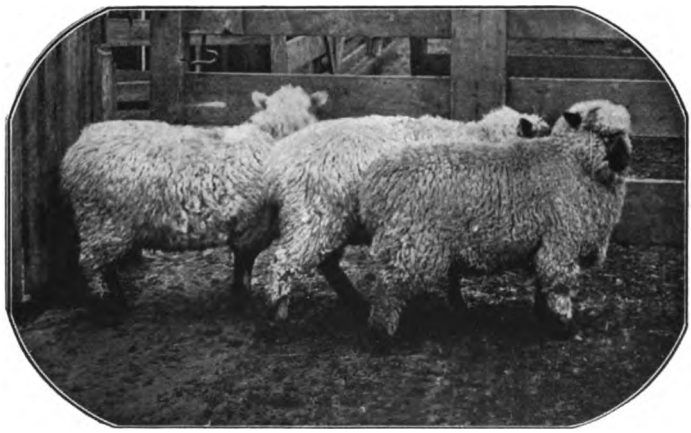

Fig. 52.—Wether Lambs, "Market Toppers."

Fig. 53.—Wether Lambs peaceably devoting their energies to body building.

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this by that date their flesh has become rank and therefore of inferior quality. According to the evidence of extensive dealers, fully fifty per cent of ewe lambs of the previous year marketed in February and March are with lamb. These men go so far as to assume that much of the mating is intentional with a view of securing slightly increased weight. However the condition comes about, the trade suffers from such bad management and the breeder is the loser. Buyers soon become familiar with the condition of stock from various districts, and bid accordingly. Up to the beginning of October ram and wether lambs sell upon about equal terms, but after that date discrimination begins on all the best markets. By the middle of the month the reduction for rams on Canadian markets is about half a cent per pound, and by November fully one cent per pound difference in favour of the wethers is made, and unless the market is bare rams are difficult to sell. In Buffalo in the fall of 1907 the cuts on ram over Canadian wether lambs were on October 7, 65 cents per cwt., October 10, 85 cents per cwt., and on October 24 ram lambs were all sold as culls at one dollar per cwt. less than wethers were selling. (See Fig. 51.)

Comparison on the Block.

It is on the block that the true comparison between the ram and the wether is made plain. The former has wasted his substance in riotous living and is lean, lank and emaciated, differing widely from the plump, firm, meaty-backed wether that has devoted his energies to body-building regardless of his ignoble destiny, the shambles. (See Figs. 52 and 53.)

As the season proceeds the wether makes rapid growth, more particularly in the region of the loin and back, while the ram puts on weight in the neck and shoulders, falling away at the loin and hind-quarters, rendering him fit only for the poorest trade. To ascertain the comparative weights of ram and wether lambs of practically the same breeding and age, one dozen of each were weighed on November 1. The wethers weighed 1,020 pounds and the rams 900 pounds, an average reduction of 10 pounds per head. This, with a sacrifice of one cent per pound, amounts to a pretty impressive penalty for the neglect of castration.

Is it right and proper that the ram lambs sell for nearly as much per pound as the wethers? The one is plump, juicy and highly palatable, while the other in large measure lacks these desirable qualities. The wonder is that greater discrimination is not made by every buyer, and undoubtedly would be were it not for the keen competition for the stock. Unfortunately, the good wethers help to pay for the mean rams, inasmuch as the law of averages is brought into operation by the buyers who must have lambs, and are able to get more by paying too much for the poor specimens in order to get the good ones. The dealers have thus a fine opportunity of teaching the important lesson that they say is so badly needed.

Methods of Castration.

The castration of a lamb is a simple operation, involving little risk if performed with ordinary care and due regard for cleanliness. It is important that it be performed when the lambs are quite young. About ten days old is a very favourable age, as then they are less liable to bleed, and the healing is rapidly effected. Perhaps the oldest, and by many considered a thoroughly satisfactory method, is to cut off the lower third of the scrotum with a sharp knife, sever the outer immediate covering of each testicle separately, and draw it out, cord and all, with the teeth. This method, however, is repulsive to many unaccustomed to it, and is not as commendable as some of the other ways.

The practise followed by the writer was to have the subject held by an attendant in a sitting position upon a bench with its feet outward. The operator sat astride of the bench upon the hind feet of the lamb. With a sharp knife, the bottom third of the scrotum was removed and each testicle skinned out and withdrawn one at a time by the fingers. If the lamb has reached one month, it is better to tie the cord about

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one inch above the testicle with a carbolized ligature, before severing the organ with a knife.

Another method is to sever the scrotum, with its contents, close up to the body. If the lamb is very young there is little or no risk involved. This may be done with a sharp knife or a pair of shears or scissors. A thoroughly antiseptic method and one which prevents bleeding, is to use for severing the scrotum a pair of rather dull scissors, highly heated, so as to sear the wound as it is made. Especially for lambs that are more than three weeks old this method is recommended. It has the advantage of extreme simplicity.

The professional operator of the present day uses the lamb emasculator, an instrument much like a pair of scissors, having one blade notched, and neither very sharp. The testicles are pressed upward, the scrotum severed about half way up; the cords are thus exposed, and with one closure of the emasculator they are severed an inch or so above the testicle. The cords cut by this comparatively dull instrument do not bleed as freely as when a sharp edge is used.

By whatever system the emasculation is effected, the wound should be smeared with an antiseptic ointment, than which there is perhaps nothing better than carbolized oil, composed of one part carbolic acid to twenty parts sweet oil. The writer always used pine tar and lard in equal parts, and can confidently recommend its employment. It is very important that newly castrated lambs be given clean quarters. If the weather is cold, the pen should be thoroughly cleaned and bedded daily with fresh litter, but if the ground is warm, there is no safer place for the youngsters than a grass plot. It is clean and favourable to exercise, the latter an important consideration. In the course of a few days the lambs should be caught and examined, and any that show swelling or undue soreness should be bathed with warm water into which a few drops of carbolic acid or creolin have been added, and the wound annointed with carbolized oil or other antiseptic preparation.

The Tails.

In his earlier years, when in charge of a flock of high-class pure-bred sheep, the writer regarded the leaving of long tails as an evidence of poor shepherding and inferior stock. Perhaps the view taken was extreme, but later observation bears out the truth that the best sheep men everywhere dock their lambs as surely as they clip their ewes, while the poorest of them invariably neglect this operation. Perhaps a tail is no detriment, more particularly upon a male that is to be sold in the fall, but it looks bad to the sheep man and surely detracts from the blocky appearance of a sheep or lamb. Many who undertake to dock make a very poor job of the operation. A five or six inch tail looks about as badly as one not touched, but still one sees many half-tailed lambs. For best effect, a male lamb should be docked within one inch of the buttock, while a female should retain one or two more joints.

An ordinary chisel is a common docking instrument. The tail is held on a block, and with mallet and chisel the operation is performed. A better way is to use a sharp knife with a fairly long blade. The lamb is held with its back firmly against the breast of the attendant, who grasps the tail close to the body, drawing the skin back firmly. The operator with his left thumb nail finds the joint, which is larger than the bones between. With a firm slash he detaches the tail, and if the joint has been struck, the shock as well as the bleeding are less severe than if the bone has been cut. The drawn up skin when released slips down, protecting the bare end.

From one week to two weeks is a good age to tail the lambs, and while it seems like doubly severe treatment, the wethering and tailing are usually performed at the same time.

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FEEDS AND FEEDING.

The standard foods for sheep are grass and clover pasture in summer and hay, preferably clover with roots, during the winter. When pastures fail in summer or autumn such soiling crops as green corn, vetches, rape or cabbages may be fed with advantage; or vetches or rape may be used as pasture. During the winter season well saved pea straw or even oat straw may be used as a part of the dry fodder, but if no grain is being fed the flock should have at least one feed daily of well saved hay.

Of the several classes of roots nothing surpasses swede turnips, but greystones in the early part of the housing season and mangles at the end of the winter and spring constitute very satisfactory succulent rations. Corn ensilage of good quality may also be used if roots are short or it may be fed along with roots or alternately with that food throughout the winter.

The growing of ordinary hay, pasture and roots for sheep feed does not differ from the cultivation of these crops for other classes of stock. Such special crops as rape, vetches, cabbage, lucerne, etc., are easy of cultivation, and may be successfully grown on any farm suited to sheep raising.

Clover.

Of all the fodder crops grown on Canadian farms clover is of greatest importance to the sheep grower. All of the commonly grown varieties, including alfalfa (separately treated in these pages), alsike, white and common red, are useful on the sheep farm. On account of their leafy character and sweetness they are greatly relished, and because of their highly protein content they are very nourishing.

Practically all of the clovers are useful as pasture, although precautions are necessary when feeding the larger sorts while in very green or immature condition. Sheep graze closely, and do well upon small white clover commonly found in most Canadian pastures.

Alsike is more useful as a hay than a pasture crop, although sheep will graze it freely while young and tender. Common red clover is the chief food crop on the special sheep man's farm. It affords excellent pasture, but when very rank or succulent sheep must be grazed on it with caution to avoid loss from bloating. Precautionary methods outlined in discussing the feeding of rape apply with equal force to the pasturing of clover.

All of the strong growing clovers make excellent sheep hay. Its value is lessened in proportion as it is coarse, over ripe when cut or badly cured. For breeding ewes good clover hay alone may furnish a full ration sufficiently rich to keep up their condition. No other hay is so valuable for young lambs, growing or fattening stock, or sheep being fitted for exhibition. It should be fed in small quantities rather than in greater bulk at less frequent intervals.

Alfalfa.

Alfalfa as it becomes known is growing in favour among sheep raisers as a fodder crop. It is not only a heavy cropper but it is one of the most nutritious fodders grown on Canadian farms, and practically all classes of farm animals consume it with great relish. On account of its deep and strong rooting habit it is peculiarly adapted to dry or gravelly bottom land, but it may be grown successfully wherever wheat growing is or may be carried on, except, perhaps, in very cold latitudes. It has a food value quite equal to red clover both as hay or pasture, and because of its strong growth, producing from three to four cuttings in a season, it is more valuable as a crop. Alfalfa has obtained a strong foothold in Ontario and east, as well as in British Columbia, and is gaining ground rapidly in Alberta, where it is expected to become perhaps the chief fodder crop, more particularly in the dry and irrigated sections. In Saskat-

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chewan and Manitoba it is grown to some extent, and strong hopes are entertained that in these proivnces it will yet become one of staple forage crops.

Alfalfa hay for sheep fodder should be harvested before it becomes tough, and should therefore be cut as nearly as possible to the time at which it is coming into bloom. If allowed to mature beyond that stage tough fibres develop, which are slow to digest and are liable to cause trouble in the digestive tract of the sheep. Sheep feeding on over-mature alfalfa are occasionally lost by reason of balls of fibre forming and clogging the outlet of the stomach. There is no danger from this cause if the alfalfa has been cut on the green side. Alfalfa for sheep hay should therefore be grown alone or with an early grass such as orchard grass. If grown with a later crop the latter has to be cut too green or the alfalfa becomes too far advanced.

Alfalfa is claimed by some, who have had little experience with it, to be unsafe for pasturing sheep on account of its extreme succulence and liability to cause bloat and its attendant evils. An extensive sheep raiser, Mr. G. A. Brodie, of York county, Ont., who has adopted alfalfa as his chief pasture, has the following to say in its favour:—

'Thirteen years' experience with alfalfa convinces me that it is beyond doubt the best and most economical pasture for sheep. I consider it a very safe pasture, as I never yet saw the first evil result to any class of animals, in fact I have never lost a single animal pasturing on this crop. I have heard it stated that when red clover first came into use farmers did not allow the stock to pasture on it on account of danger from bloat, etc., but now no one fears any evil results, and I think the same will be thought of the alfalfa as feeders become accustomed to it. Of the two crops I consider alfalfa the safer. I turn the stock on even when the crop is wet or in any other condition, even new animals that are not accustomed to it. I have now 50 acres of alfalfa which I use almost altogether for pasture, and at present (October 10), is as succulent as in June. No crop is more valuable, especially as a pasture, and of course for hay as well. It makes better hay than red clover I am sure, although by analysis it ranks about equal. It is cleaner than clover and stock eat is more readily.

'For hay alfalfa should be cut when about one-fourth in bloom, put in very small cocks very green, and allowed to cure that way. It is my most valued crop and is good for all stock pasture and hay alike. I think it is nonsense to say that there is danger from pasturing on it, as this is where it excels.'

Vetches.

Vetches, or tares as they are also called, make excellent fodder for sheep, either as a soiling crop or as cured hay. This crop much resembles peas in habit of growth and requires about the same kind of cultivation. Its vines are more slender than pea vines and stand up better when grown with a stiff variety of oats. Vetches are grown extensively for sheep feed in Great Britain and to some extent in Canada for the same purpose. The writer, while raising sheep, always grew a small area of tares with oats for soiling the show flock, and in case of a shortage of clover vetches were cured for hay. The crop being fine in vine and very leafy is much relished by sheep and constitute a rich diet.

Two varieties of vetches are grown for fodder. The common vetch is the chief sort cultivated, but the hairy variety is receiving some attention in recent years. The latter produces the heavier yield, but so far the seed having to be imported is very expensive and few care to bother with it.

The soil for vetches should be clean, mellow and rich. The seed may be sown in drills or broadcast. A good seeding for either soiling or hay is about three pecks of vetches and four pecks of oats per acre.

The vetches are ready to feed any time after the crop comes into blossom and before the seed commences to ripen. For soiling the crop may be hauled to racks or be distributed on the sod of a pasture as soon as cut or it may be allowed to wilt in the swath for a few hours.

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Vetch hay is made in much the same manner as clover or timothy is handled.

Vetches may be pastured by sheep, but this is a wasteful practice, as much of the crop is destroyed by tramping.

Rape.

Rape is one of the most valuable of foods for sheep. It is keenly relished and produces rapid gains both in growing and fattening stock. Rape is an easy crop to grow and yields abundantly when properly handled.

The variety of rape most suitable, in fact about the only one grown, for sheep fodder is the Dwarf Essex. This sort yields heavily of leaves and does not produce seed the year it is sown.

The culture for rape is practically the same as for turnips or other root crops, with the exception that it is not thinned in the row. It may be sown broadcast, but unless the soil is clean and rich rape does better sown in drills in order that it may be cultivated.

Rape, like turnips, does best on soil that is rich in humus; the richer the soil the ranker the growth and the better the quality of the fodder. Old pasture sod well worked up makes a fine situation for rape, and if it can be given a dressing of yard manure so much the better. Rape is a very disappointing crop when sown on poor soil, hence the importance of carefully fertilizing and preparing land to be sown to rape.

Early sowing is not suitable for rape. It is well to get the land ready to put in the seed as soon as desired after the ground becomes warmed up in spring. It may be sown as early as corn and as late as the end of July. If sown in drills the rows should be about 28 to 30 inches apart, and about two pounds of fresh seed used per acre. On clean, rich land about three pounds of seed per acre may be sown broadcast. The writer has found best success from sowing in raised drills, but others claim just as good results when sown on the level. Frequent cultivation is as beneficial to rape as to turnips or potatoes.

Some advocate and practise sowing rape amongst corn at the time of the last cultivation, and others sow it in oats, harrowing in the seed when the oat plants are two or three inches high. It is well to learn from careful test upon a small scale whether one's conditions are suited to methods of this kind before undertaking them upon a large scale. A season of rank growth followed by a wet harvest may cause much trouble and annoyance if rape has been sown with oats. Undoubtedly the best crops are produced when rape is given the land to itself and proper cultivation is afforded.

Under average conditions the rape plant requires about two months to reach the best condition for feeding. When fed too young serious digestive derangement may result, in the form of scouring or bloating. After reaching its growth it remains fresh and crisp for several weeks under normal weather conditions, but after a time it becomes more or less woody or stringy, in which condition stock do not relish it so much.

Rape is usually pastured off, but it is exceedingly valuable for soiling. A feed a day of rape hauled to a flock of ewes on a failing pasture proves an excellent safeguard against the animals running down in condition.

All classes of sheep may be pastured on rape. It is an excellent crop on which to turn lambs after weaning. It is quite as suitable for toning up the breeding flock prior to the mating season.

Precautions have to be observed in pasturing rape. Until they have become accustomed to it sheep should not be turned into rape pasture while hungry. Neither should it be fed wet with rain or dew or at all frosty. If precautions are neglected serious loss may be experienced from scouring, bloating, and even death from inflammation of the bowels. It is well to allow sheep pasturing on rape free access to a grass pasture. It was the practice of the writer after the season of white frosts had arrived to fasten out the flock from the rape in the evening until the crop was almost

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or quite dry the following morning. Many rape feeders disregard this precaution, claiming that after sheep become accustomed to it rape feeding is not attended with danger. A feed each morning of oats and bran go a long way toward preventing untoward results. Experienced feeders have found that irregular salting greatly increases the danger from illness when sheep are on rape. A feeder who lost sheep after each salting found a complete remedy in withholding salt altogether while rape was being pastured.

It is estimated that an acre of rape pastured by 40 head of thrifty lambs receiving a moderate grain ration daily will yield 400 pounds of mutton.

As a soiling crop rape is an excellent mutton maker. As soon as the plants are well grown they may be mown with a scythe or reap hook, to be hauled to the flock either in a shed or pasture. If sown in May it should be ready to cut and feed in July, and at the least one more cutting may be expected during the fall. It should be cut not lower than four inches from the ground, which will leave stumps that will produce a strong second growth. Provided over-feeding is avoided, there is comparatively little risk attending soiling sheep on rape.

Bloat is the most common trouble in rape feeding. When noticed in the first stages the subject should at once be removed from the rape. Salt and water given as a drench is a simple and much used treatment. A pint of a strong solution in which all the salt is dissolved constitutes a dose for a full-grown sheep. Aromatic spirits of ammonia is also a good medicine for this trouble. A tablespoonful in a pint of warm water will usually afford relief. If the case is so far advanced that the subject is down and the abdomen much distended, then the latter should be punctured at the point of greatest swelling with a trocar and cannula. If, however, one has insufficient confidence in his surgical ability to perform this comparatively simple operation, it may be advisable, if recovery otherwise appear improbable, to adopt the time-honoured policy, and kill the animal to save its life.

Cabbage.

Cabbage has long been used as a food for sheep. This crop is easily grown, produces heavy yields and provides an excellent fodder from early fall until well on in December.

Cabbages are grown by the same system as roots or rape. The ground should be worked up and manured the previous autumn. The seed is sown as early in spring as the ground is fit and the weather has become favourable for growth. The date of seeding is about the same as for carrots or mangels. The ground should be finely prepared, and the seed sown in drills about thirty inches apart. After the plants appear above ground cultivation should commence, and when the second leaves have appeared the plants should be thinned out to about eighteen inches in the drill. Frequent cultivation during the season will insure rapid growth and an abundant yield of excellent fodder. From 18 to 20 tons per acre is not too much to expect on rich soil with a heavy yielding variety.

The crop is ready for feeding when the heads are well formed and have become firm. It may be fed from the field until the time turnips are harvested, when it should be stored in a pit or shed sufficiently protected to keep out hard frost but well enough ventilated to guard against heating.

Cabbages may be fed on the pasture or in troughs in a shed. While the sheep will consume them from the whole head, it is preferable to divide them into comparatively small pieces in order to be more easily eaten. For giving variety to the ration or adding a valuable succulent food, cabbage fills an important place on the sheep farm.

Turnips.

In many of the most successful sheep raising countries turnips are considered almost as indispensible as grass. In Great Britain turnips constitute an important part of the ration of the sheep flocks from the time the crop is ready to use in the

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autumn until grass arrives the following spring. To fattening sheep and growing stock they are fed in practically unlimited quantities, and for breeding ewes turnips are considered a necessary part of the ration. In Canada the great majority of successful sheep raisers feed turnips. The excellence of many pure-bred flocks in which international prize winners are reared is in great measure due to the liberal use of succulent foods, and no other green crop is so generally used as turnips in the winter season. Apart from their food constituents turnips have a wonderful effect in maintaining a vigorous condition of the digestive organs and general system.

Young lambs born in the winter or early spring are greatly benefited by liberal feedings of finely sliced turnips until grass arrives. Not only are the lambs started into vigorous growth, but their dams are relieved from much worry and tugging.

Previous to lambing ewes should not be heavily fed upon turnips or other roots; from 4 to 5 pounds per day are very beneficial, but much more than this quantity is liable to cause abnormally large, soft lambs, deficient in vitality. After lambing the turnip ration may be gradually increased even to as much as will be eaten twice or three times a day, provided, of course, sufficient nourishing dry food is given as well. The turnips keep the ewes in fine vigour and greatly help the milk flow.

Growing and fattening sheep may be liberally fed on turnips, with a suitable grain ration with such roughage as clover hay and pea straw. A ration of turnips is of great assistance in building up young growing stock and fattening animals.

A good method of preparing turnips for sheep is to cut them in strips by an ordinary machine cutter, or they may be pulped. In the latter condition the roots may be mixed with chaffed straw, rendering the latter more palatable than when fed dry.

Mangels.

In localities better suited for the growing of mangels than turnips the former crop may be to some extent utilized for sheep feeding if certain precautions are observed.

For some reason, probably the large quantity of sugar contained in mangels and beets, these roots when fed heavily to sheep bring about an unhealthy condition of the kidneys and other organs. This is particularly true in the early part of the winter, and even up to the spring months breeding sheep, particularly rams, should not be heavily fed upon this food. In the absence of turnips a few pounds per day of mangels may be given with advantage. As spring approaches they become less dangerous, and by April they may be fed quite generously.

For late spring feeding mangels are given preference over turnips by many expert sheep men for the chief reason of their excellent keeping quality. Even well into the warm weather they retain their crispness and flavour when properly housed or pitted. Many turnip growing sheep farmers in Great Britain and in Canada reserve a pit or cellar of 'Globe' mangels for May feeding, and it is not uncommon to find this root composing a part of the daily ration of show sheep even up to the middle of June. The preparation of mangels for feeding is the same as already described for turnips.

Corn.

Corn is very widely used for feeding sheep. In corn-growing sections no grain is more used than corn for fattening sheep and lambs. For soiling in the fall green corn is an excellent fodder plant, and corn ensilage fills a place on the sheep farm.

Corn is not a suitable grain to feed alone, unless in very small quantities to improve a ration of hay and roots. Sheep fed on corn alone are liable to go off their appetites and become ill from digestive derangements. Corn fed with roots and hay at the Michigan Station produced a weekly gain per head of about two and one-half pounds. A grain mixture of corn and oats gave about equal results.

Corn and hay fed to lambs for fifteen weeks at the Michigan Station gave an

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average weekly gain of less than one pound per head. At the Minnesota Station lambs fed for twelve weeks on cracked corn and hay gained weekly an average of 1·75 pounds per head.

Corn should invariably be fed to sheep mixed with other grain. In an experiment in feeding whole corn, corn and peas, corn and oats, and corn, peas and oats to lambs in addition to hay, the corn gave the poorest results of all in gains. The average weekly gains per lamb were as follows: Corn, 2·6 pounds; corn and oats, 2·7 pounds; corn and peas, 3·15 pounds. A mixture of peas, oats and corn in equal quantities fed with hay gave a weekly gain of 3 pounds per head. Bran, oats and corn fed under similar circumstances gave a weekly average gain of 2·3 pounds. If to this ration some such succulent food as turnips or mangles had been added, with a small proportion of oil cake, an ideal fattening ration would have been compiled.

During the season of failing pastures in the autumn a daily feed of green corn is useful for keeping up the flock. The corn should be put through a cutting box and fed in troughs. A small quantity of bran mixed with the cut corn adds delicacy and feeding value to the ration.

Corn Silage.

Silage is fed to sheep on many farms. When well preserved it is relished by the animals, and affords a valuable succulent food. From 3 to 4 pounds per head daily is about as much as experienced sheepmen care to feed. Fed in larger quantities, or if too acid, it is liable to cause serious indigestion. At this rate silage fed with clover hay comprises an excellent ration for wintering ewes, and when to this a grain ration is added a profitable fattening ration is secured.

At the Wisconsin Experiment Station corn silage was found to be about equal to mangels for ewes rearing lambs. The lambs made slightly better gains when roots were fed to their dams, but the silage was produced at a slightly lower cost. The feeding value of good silage and roots for sheep, according to experiment station tests, is about equal. When fed with caution they give similar results on the ordinary farm, but for general practice on the Canadian farm no succulent food can equal swede turnips, on account of their safety and beneficial influence upon the stock. The variation experienced in the maturity and other qualities of corn silage renders it less uniform in its results for sheep feeding. When rich in grain it is too heating, and when immature it is too acid to be easily digested or keenly relished. Where roots are not available silage is a fine substitute, or the two foods may be fed alternately during the housing season.

Peas.

Peas constitute a very important crop on the sheep farm. They are useful as a soiling crop, they are fed unthrashed to fattening stock, as a grain they are highly valuable when mixed with oats, and as a cheap fodder no class of straw can surpass well saved pea straw for wintering ewes.

As a soiling crop, peas are frequently sown with oats, or oats and tares. Sheep delight in a leafy food, and leave only the coarsest of the bare peavines in their rack. A bushel of oats, a bushel of peas and half a bushel of tares per acre constitute a seeding for a fine mixture to be fed as a soiling crop.

Good judgment and much caution are required in feeding unthrashed, mature peas to sheep. If given too liberally there is likely to be loss of animals from over feeding. By commencing with a small quantity, well distributed, the sheep will gradually become accustomed to this food, when it may be cautiously increased. For fattening sheep or milking ewes peas fed in the straw give excellent results.

There is probably no grain ration that can surpass a mixture of one part peas (preferably cracked), two parts oats and one part wheat bran. This mixture is well balanced in essential food constituents, it is sufficiently light to be readily digested and it is much relished by the stock. From half a pint to a pint and a half per day is a moderate ration according to the size of the animals and the object in view.

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Many of the best flocks of breeding ewes are wintered upon pea straw as the rough diet. If the peas have been harvested on the green side by a harvester that cuts the crop, and taken off without bad weather, the resulting pea straw is much liked and very nourishing. If the ewes come into winter quarters in good condition they will require little else than roots and good pea straw until approaching the lambing period, when clover hay should be gradually substituted for the straw. Ewes that are thin should have at least one feed of clover hay or a small ration of oats in addition to the pea straw.

Pea straw is bulky stuff to feed in racks, and unless the racks are roomy, and the bars so far apart that the sheep can insert their heads, it is preferable to feed the straw on the ground in the yards close up to the fences. If crowded tight against the fence the straw will be thoroughly picked over before being soiled. When feeding pea straw, or other chaffy fodder, great care should be exercised in keeping the litter out of the fleeces of the sheep.

Oilcake.

Oilcake is a favourite food on the majority of the leading sheep farms of Great Britain any many of those in Canada. This nutritious by-product of linseed oil works, known as 'cake' by the British shepherd, is peculiarly adapted for sheep and lambs being hastened forward for the show ring or for market. It is not only highly palatable and rich in protein—flesh-forming material—but is pre-eminently a safe food. It is mildly laxative and exercises a salutary influence upon the digestive organs. It may be mixed with any kind or mixture of grain or chop, but on account of its highly nitrogenous nature it is peculiarly adapted for feeding with corn. The feeding of oilcake gives thrift to sheep, enabling them to make the maximum of gain from their ration of whatever sort.

Oilcake in the finely nutted form is excellent food for lambs, particularly before grass arrives in spring. A limited amount, from a quarter to half a pound each, is excellent for breeding ewes or other sheep being wintered on dry feed. For fattening lambs or show sheep it may with advantage be used in generous quantities. As a rule it should be mixed with grain and may form from one-tenth to one-quarter of the grain ration, according to the relative market values of various feeds.

Oats.

Oats should, and usually do, form the basis of grain mixtures for sheep feeding. They are palatable, highly nourishing and safe, and being easily grown they are usually at hand on every arable sheep farm. As a single grain food oats answer practically every requirement. Whether for toning up breeding stock, fitting show sheep or fattening for market, oats are the most universally fed class of grain.

For young lambs just commencing to eat no better grain can be found than ground oats, with the coarsest of the hulls sifted out. In a few weeks the lambs will take them, hulls and all, and as a rule thrive well. To hasten fattening for market a mixture composed of oats, cracked corn or peas and oil cake in the nut form, mixed in the proportion of 2, 2 and 1 parts by weight can hardly be surpassed. Lambs on their mothers may safely be given access to a mixture of this sort. Breeding ewes may safely receive one pound of oats daily before lambing; and a larger amount of oats or the mixture recommended for lambs afterwards until they go to pasture.

For sheep that are being fattened oats may constitute the sole grain ration, as after a short time they may be given about all they will clean up without risk of sickness. More rapid gains may be secured from the addition of peas, corn, or oilcake. If the oats predominate and the whole is well mixed heavy feeding may be carried on without much risk.

As a soiling crop a mixture of green oats, peas and tares are much relished and very nourishing. A seeding mixture of two parts oats, two parts peas and one part

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tares, by measure, sown at the rate of three bushels per acre, yields a heavy and valuable fodder crop. In order to secure several weeks' feeding in good condition seeding should be done at intervals of one week from as early in spring as seeding can be done for a month or more. The crop may be fed in racks in sheds or pastures, or even distributed in rows on knolls or along fence sides. At a time of failing pastures a few weeks of soiling is highly valuable for keeping up the condition of the flock. Oats for soiling are at their best when headed out and have reached the milk stage.

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SHEEP BARNS.

Sheep originally belonged to the uplands, where they were able to obtain pure air and the maximum of sunlight. Under domestication sheep prefer dry, airy fields and quarters, and do badly if deprived of these conditions. In the pasture the sleeping place of the flock is invariably the dryest knoll accessible, even when other classes of stock would seek more sheltered quarters. In the old world sheep are comparatively little housed, especially in Great Britain. In Canada, what with cold winters, inclement autumns and springs, a certain amount of housing is necessary in order to produce wool and mutton of the highest quality at the least cost.

On the Canadian farm the sheep house is generally the cheapest and poorest of the stock building. A house that keeps the sheep dry and out of the wind answers the requirements. Over zealous sheep men of limited experience occasionally provide expensive barns badly suited for sheep housing because of a lack of provision for proper ventilation. The main features of a sheep barn are the following: good ventilation without draughts, sunlight, convenience for feeding, adjustable divisions, capacity for storing hay, grain and roots, and above all a tight roof and a well-drained location.

The dimensions of a barn will depend somewhat on the size of the breed. For breeding stock a space per head of at least twelve square feet is required, and eighteen is not too much for large ewes. However, a barn 40 x 40 feet laid out as shown in Fig. 54, should accommodate from sixty to seventy-five head.

The Plan Described.

Moveable feed racks sixteen inches wide are desirable. These may form the divisions, leaving an alley three feet wide on two sides of each pen. They should have perpendicular sides with slats on the feeding side far enough apart to allow the sheep to put their heads through. When arranged in this way the sheep do not pick the food out to become trodden under foot and wasted. Where the attendant has to go in among the sheep to distribute the feed, there is always more or less annoyance and loss from litter or chaff getting into the fleece. The feed room is so situated that the root-house door opens into it and the feed from above comes down in chutes.

The doors are large enough to permit of a wagon passing through to take out the manure. In fine weather the upper half of the doors may be kept open. The windows permit plenty of light. The lamb pens are simply hurdles 4 to 5 feet long and 3 feet high, hinged together. A pair of these placed in a corner form a pen. In cold weather for protecting young lambs a pen can be closed in by hanging burlap or heavy cotton from the ceiling to the racks or even to the floor.

The Construction.

Any style of construction suitable for other buildings is satisfactory for a sheep house. A somewhat new form of barn that is proving satisfactory where used is represented in the accompanying illustrations. It has a semi-circular or oval roof, so constructed as to require no dimension timber, and at the same time is self-supporting, requiring no posts on the barn floor. This form of construction requires a minimum of lumber, thus saving much in cost of material. In addition no framing is necessary, so that any handy man can put the building up at a much less cost than an ordinary framed building of similar dimensions could be built for.

For foundation walls, stone and cement concrete are the common materials now used. A stone wall is stronger if cement mortar is used. Cement concrete is the cheapest and most durable in the end if properly made. The foundation, whether pillars at intervals or a continuous wall, should be put below the frost line on solid ground. The bottom of the wall should be the widest, and the slope upwards should

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be gradual. This will lessen the effect of frost on the wall, as the ground will heave away from it. In building the wall make preparation for putting in a modern system of ventilation.

The accompanying plan, Figs. 54 and 56, provide for a cement root cellar, 14 feet square, 10 feet high at the barn, and 7 feet high at the opposite side. The walls are 1 foot thick. The roof of the root house is also of cement, and the driveway into the barn is over it. The chute for filling the roots into the house is shown in the plan of the upper floor, Fig. 55. This may be placed where desired, even in the barn floor. The studding for the walls of the main barns may be 9 x 2-inch studs, which will leave a large, dead air space, but 6 x 3-inch studs leaves more space inside. These

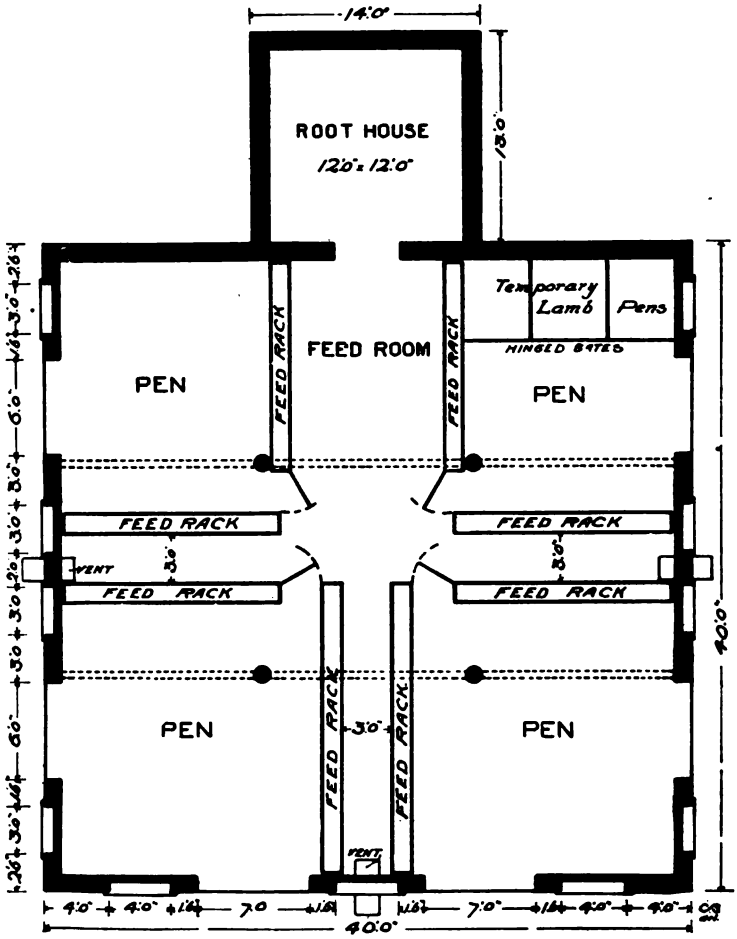

Fig. 54.—Sheep Barn, Ground Floor Plan.

are placed two feet apart. The girders are supported by posts or pillars (either of wood or cement) one foot wide. These should be round or octagonal in form; square corners do much damage if animals crowd or rush against them. Planks 12 x 3 inches and long enough to allow good splicing over the pillars will be strong enough. Two 9 x 2-inch pieces placed 2 inches apart and strengthened by a ¾-inch iron rod as shown in the dotted line crossing the building in Fig. 57 answers well. The joists may consist of 9 x 2-inch plank about 14 feet long. The walls of the barn, which are 18 feet high, may have the same sort of studding as used below. The studs should be placed three feet apart and project one inch beyond the outer edge of the lower studding.

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For the outside, rough boards and tar paper should cover the first story up to where the studs of the second story project one inch, then clapboards cover both stories. Inside the walls should be sheathed and the ceiling covered with two thicknesses of inch tongued and grooved lumber with tar paper between. This covering will prevent the stable odours from reaching the food stored above.

Doors and Windows.

The doors are wide, the end ones being six feet and the side ones seven feet. These permit of driving in to clean out the place, and give liberal room in case the sheep stampede, as they often do if frightened. The top half of each door is hinged

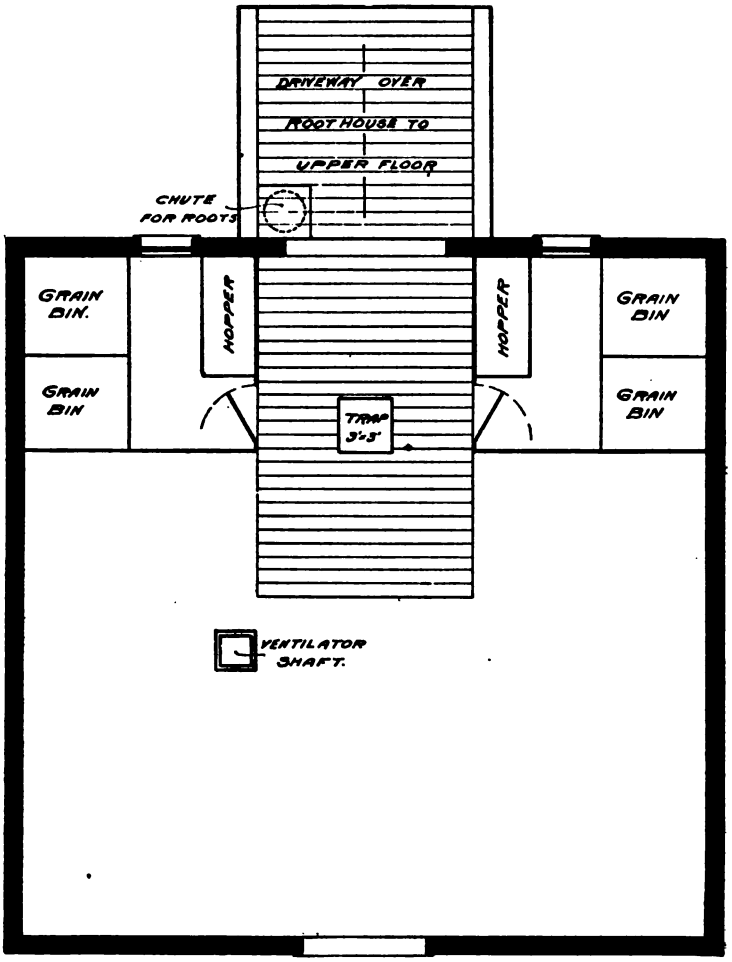

Fig. 55.—Plan of Upper Floor.

above, and opens inwards and upwards. In fine weather these may be kept fastened up. The windows are large, 5 x 4 feet, and placed high up to admit the maximum amount of sunlight. These may be either in two sections and push back towards each other, or be hinged at the top and swing inward like the top half of the doors.

For the barn floor, a single floor, except over the driveway, is strong enough. Dry tongued and grooved material 1¼ inches thick and well nailed makes an excellent floor. The driveway part should be covered with 2-inch plank laid crosswise of the driveway. As the barn can be filled from the ends it is not necessary to build a drive-

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way floor more than half way through. The feed chute is 3 x 3 feet, and the grain pipes from the hoppers, 12 x 6 inches.

Construction of Roof.

The roof is semi-circular (see Fig. 57). The planks or rafters for the frame are cut with a diameter two-thirds the width of the building. If A.C. be two-thirds the width then the Arc. A.L.H. forms one-half the roof taking C. as centre. The circle D.G.H. forms the other half drawn with B.D. as diameter and B as the centre. As each half of each arch is framed exactly alike, it will be necessary to explain but one. Take the Arc. D.G.H. This is divided into three equal parts, H.G., G.M., and M.D.

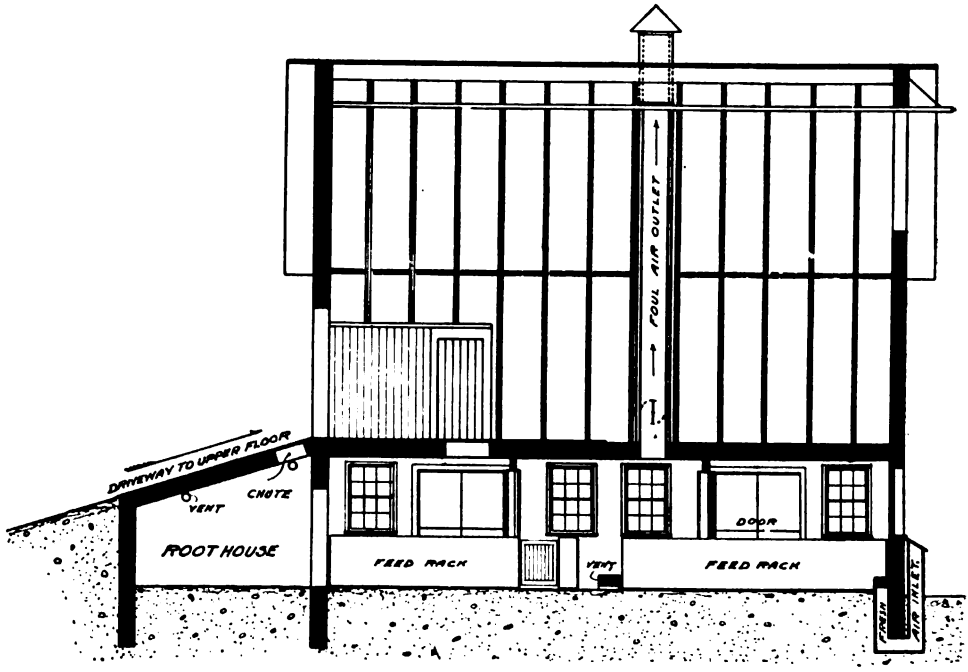

Fig. 56.—Longitudinal Section.

By measuring the length of one of these divisions the length of the plank necessary will be found. In this case the planks are 12 feet long. They should be 10 inches wide and 2 inches thick. Five planks will make the arch or one rafter. In framing the arch the plank should be wide enough to leave at least 2 inches at each end after the side has been rounded off. A straight line passing through the points B. and G. or B. and M. will give the cuts at the points G. and M. Three pieces form the side and two pieces rounded in the same way are required for doubling over the joints at G. and M., meeting at N. the line B., N. giving the cut. These should be well nailed each to the other. The cut at H. is obtainable by a line drawn at right angles to the floor and from the centre of it. The cross piece P.R. acts as a brace and also carries the horse fork. The eaves project 2 feet beyond the wall. The slope in the piece marked T. is obtained by using a circle with the same two-thirds diameter, but the cut is taken on the underside of the plank and then turned concave side up. Each arch can be framed and put together (always well nailed) on the floor, then raised into place and spiked at the bottom. To support the arches for the door space a plank is placed across under them and supported at each side by upright planks. These uprights are attached by braces to the main wall. Some barn doors swing out, others swing in, but rolling doors carefully put up and on good rollers are most convenient and serviceable.

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For a flock of from twenty to thirty sheep a building 20 feet wide by 30 feet long, with the addition of a suitable yard, will be large enough. The plan of construction may be practically the same as in the larger building, but proportionately lighter planks may be used in the roof construction.

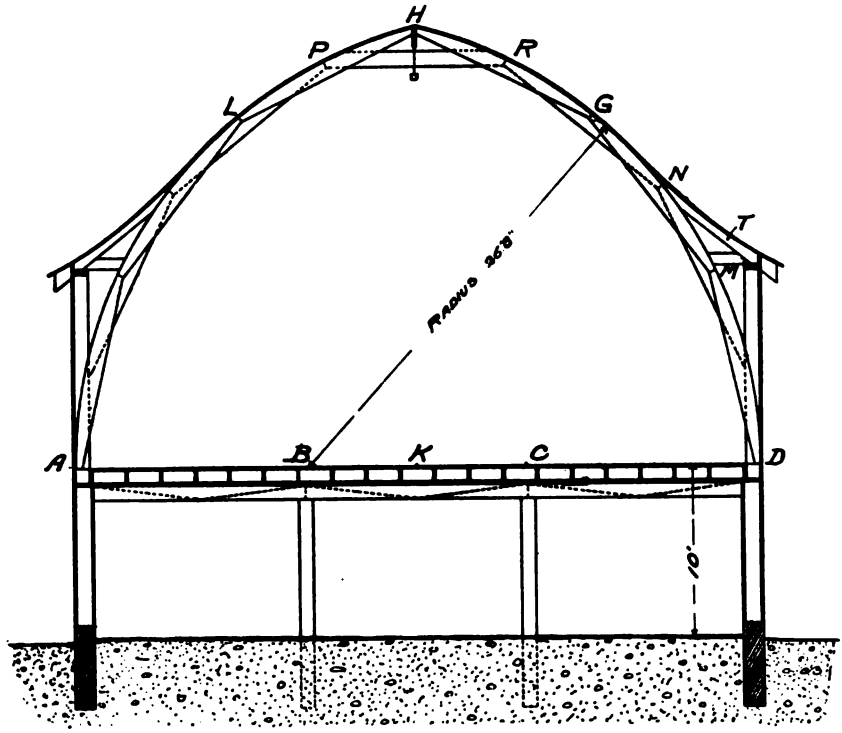

Fig. 57.—Cross Section.

Ventilation.

Many sheep barns are ventilated simply by the doors and windows. If on two sides of the building windows are left partly open the air should be fairly pure at all times. Some prefer to keep the windows closed, depending on a separate system of ventilation.

To-day many systems of ventilation are in use. Some that work well in places are said to fail in others. Much depends on a careful installation of the system, and afterwards careful handling. At the Experimental Farm at Ottawa, many of the best systems have been tried. The 'Rutherford' system, illustrated in Fig. 58 and described below, has proved most satisfactory. In a slightly modified form it has replaced all the others. In this system six 'U' tubes, or boxes, 18 x 9 inches, take the air from the outside and deliver it at the floor inside. These tiles or boxes are brought up the wall on the outside a couple of feet, and to keep the snow and rain out a board is put on to form a roof, leaving a portion of the sides open to an extent equal to the capacity of the pipe or box. The boxes should go down into the earth at least three feet so as to avoid any possibility of draft. The opening inside is at the floor level, as shown in Fig. 58. This should be protected by an iron grating. Or the pipe may project a few inches above the floor, the opening at the sides being covered with wire screens, as shown in the longitudinal section, Fig. 56. This allows a free passage of the air and keeps straw and other material out of the tubes.

The outlet is a double-walled tube having a dead air space between. It is 2¼ feet square, and both the outer and inner jackets are of tongued and grooved lumber.

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The double wall with the dead air space reduces condensation to a minimum and promotes a better draught. The draught is regulated by a damper in the out-take chute to which control ropes are attached. By closing this damper the outward current is stopped and the inflow very materially checked. The closer the barn is built the better the system will work.

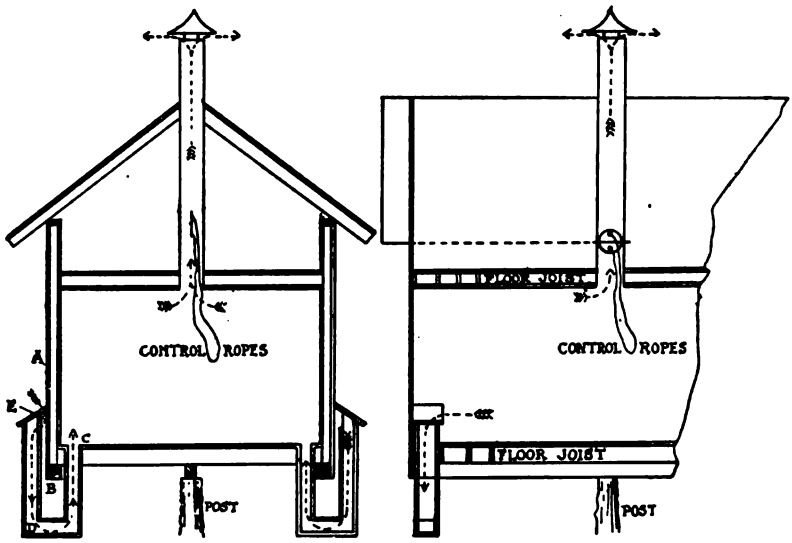

Fig. 58.—The Rutherford System of Ventilation.

A.—Wall of stable.
B.—Foundation of stable.
C.—Floor level.
D.—Intake box through which fresh air passes.
E.—Opening in side of intake pipe.

The drawing on the left hand represents the damper in the out-take pipe open, and the system therefore in full operation. The drawing on the right shows the damper closed, under which condition both the intake and outtake are inoperative.

An Inexpensive Shed.

The barn described is fashioned after the ideas of extensive sheep owners having pure-bred flocks. It is built rather more substantially than would be necessary for a commercial flock from which early lambs are not yielded. Many excellent flocks of sheep are wintered in simple sheds, facing the south, open in front and closed tightly at the ends and back. It is well also to have the front closed for a short distance from either end. Such a shed should be not less than 20 feet wide. A building 50 feet long, if provided with a comfortable yard, would accommodate 85 to 90 head of medium sized sheep. The feed racks may be movable and stand across the building in pairs four feet or more apart, forming passages for feeding, or they may be constructed against the back wall. Unless the sheep can be penned out of the building when the feed is being distributed the cross racks are preferable, as then the feeder is not crowded off his legs by the hungry animals, nor are the sheep in danger of having their fleeces littered with fodder. These racks may be used for hay, grain and chopped roots. They should, therefore, be built with close bottoms and sides, the latter about 3 to 4 inches high. The sides should be slatted about 9 inches apart, so that the sheep may poke their heads through while feeding. Racks made in this way save feed from being trodden under foot and each sheep is able to hold its position at meal time. Such coarse fodder as pea straw, or like material, may be fed on the

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ground in the outer yard. If placed along the fences, in not too large quantities at a time, it will be carefully picked over without waste. What is left may be gathered up to be used for bedding.

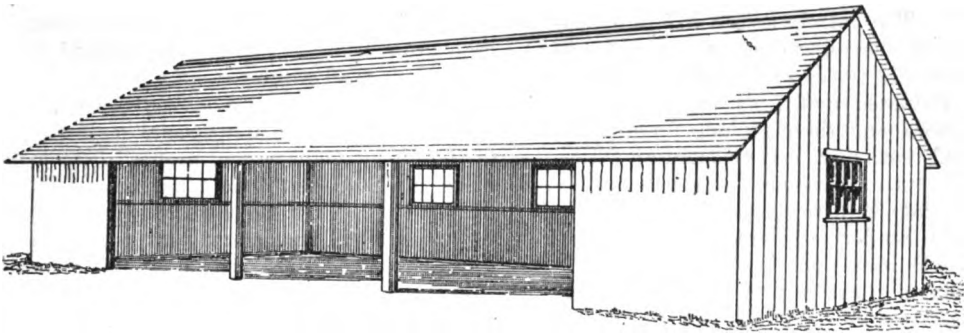

Fig. 59.—An Inexpensive Sheep Shed.

Even though the front of the shed is open a good sized window at each end and two or more at the back are desirable. A stock barn of any kind cannot have too much light and there are times when a cool breeze from the north affords great comfort to the stock.

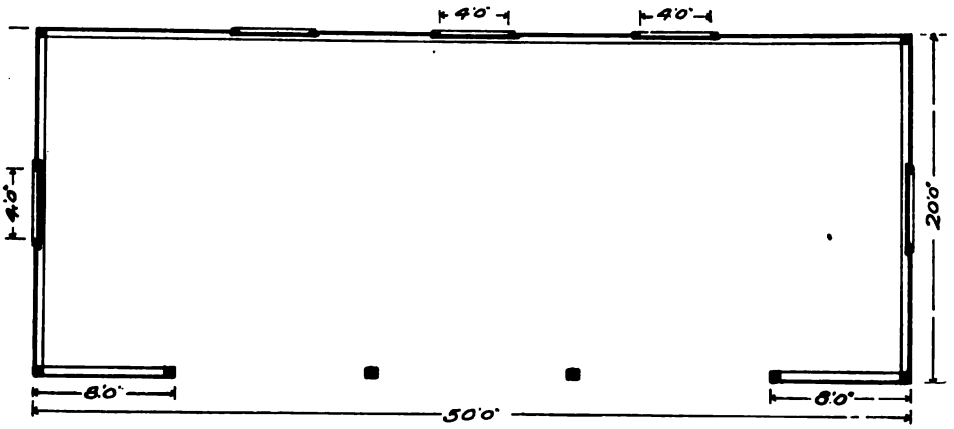

Fig. 60.—Floor Plan of Shed.

Any sort of cheap construction that provides the qualifications of durability and freedom from draughts answers well. The walls may consist of a single ply of inch lumber well nailed on to a scantling frame, battened on the outside and lined with tarred paper, which may be held on by cull lumber as high as the sheep can reach, and by strips above that line. The roof must be close and the floor dry. With these qualifications the cheap house described and illustrated in Figs. 59 and 60 fulfils all the actual requirements of a sheep barn, unless one raises early lambs. In such a case warmer quarters provided with small divisions and conveniences are necessary.

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SHEEP AS WEED DESTROYERS.

The variety-loving habits of sheep in the matter of diet render them very useful in destroying weeds that give trouble in crop growing. It is a well understood fact that the sheep-raising farmers have the cleanest as well as the richest farms. It is calculated that fully ninety per cent of the troublesome weeds are readily eaten by sheep, and these include practically all of the kinds that demand special methods of cultivation on many Canadian farms. With intelligent management cropped land may be entirely cleaned of nearly all weeds, while the few that remain will be so thoroughly kept in check as to give little trouble. If allowed to act as scavengers, sheep will render excellent service in the work of cleaning up permanent pastures, private roads, fence borders and other out of the way places, and if turned on stubble following a grain crop many late seeding weed plants will be nipped off and turned into mutton.

The broad statement, that sheep consume a larger percentage of farm weeds, is too general to be very instructive. In the preparation of this bulletin a number of successful sheep men were consulted with a view of securing specific information upon the weed question, based upon experience and observation. In the following paragraphs these authorities tell their own stories.

Sheep Improve the Grade of Wheat.

A. D. Gamley, Griswold, Man.—'I feel ashamed that after keeping sheep so many years I am unable to give you the names of all the noxious weeds sheep will destroy, but I have no doubt the reason is on account of the sheep. These weeds never bothered me much, and in this respect I was not observant; however, it seems to me that they eat them all, with the exception of the blue burr and thistles. Before coming up here from Brandon I kept from 100 to 120 breeding ewes, and had unlimited pasture where they were herded from seven in the morning until five or six in the evening, when they were turned into a seventy-acre pasture field, and where they also remained on wet days. There never was a weed to be seen in this pasture. In the fall after the grain was stacked they were turned on to the summer fallow which had grown heavy with weeds. Because I had no fencing then I could not turn in the sheep until the grain was nearly all stacked; in a very short time the field would be as bare as a billiard table. I might say that in one or two years when wheat was being docked from two bushels to five and seven bushels to the load, I was shipping my own wheat from Martinville and had the grade certificates come back marked no dockage, and one per cent is all I was ever docked. My summer fallows would be from 40 to 70 acres, and at times it would have from 175 to 240 head, including lambs, feeding upon it.

'I might mention an incident that occurred this summer, and which taught me a lesson. I had two or three acres of rape sown with the ordinary grain drill but with only a few holes left open. I mixed the rape with oats that got badly heated in the granary, and which I thought would not grow, but they grew. I ran the cultivator through once but had no time to do it again. The sheep happening to get on to it one day, I noticed that they ate the oats and left the rape, so I put them on an hour every day until the patch was rid of oats and other weeds and only the rape left. I did the same with the potato patch, and they cleaned that up. They will not eat potato tops, at least not until late in the summer. There is not the slightest doubt that if a farm is fenced so that sheep can be put just where wanted they cannot be beaten for ridding a farm of weeds, and I think they and the growing of barley are the only solution to the wild oat problem.

'With regard to hay, sheep will eat most of the weeds in the hay, before the hay; they pick the weeds out first. They are not over-fond of stink weed, a very troublesome plant in Manitoba, but will eat it when young but not after it has gone to seed.'

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Blue Weed and Wild Mustard.

Richard Gibson, Delaware, Ont.—'My first experience with sheep as land cleaners was on an abandoned farm on Long Island, on which grew a quantity of second growth scrub difficult to subdue. We cut down the scrub growth and put on sheep to keep down the following year's sprouts. For the purpose we had Atwood Merinos and imported English sheep of the mutton persuasion. The Merinos were infinitely better for the purpose than my English favourites. They continued to work day after day, nibbling here and there wherever a sprout presented itself. The English breeds on the other hand wanted their meals served up by English butlers; give them good grub and all the leisure between meals and they are barons of their order, but work they will not.

'On my present farm, purchased a number of years ago, the pastures were overrun with the weeds known as blue weed, locally called 'blue devil.' One eighty acres was a complete mass of blue flowers, admired by all artists or poets who passed thereby. I doubt if to-day 100 plants are in flower on those eighty acres. Sheep alone did it, and registered Shropshires at that. The sheep disdain eating this plant until the flowers are in evidence, then they nibble the heart out, flowers and honey—not a bad combination, especially for sheep.

'I believe sheep would eradicate wild mustard if used intelligently for that purpose. That they are very fond of it in two stages of its growth I am convinced. They eat it readily when very young and again when in blossom. I cannot bear this out from experience with wild mustard, but I do know that in my part of Lincolnshire white mustard was extensively used as a forage plant, more particularly for breeding ewes during the autumn.'

Weeds Increase as Sheep Decrease.

James Bryson, Brysonville, Que.—'Following my father's example, I have kept sheep since my boyhood. My experience and observation leads me to the conclusion that sheep will eat practically all weeds that have no bitter taste. Some of those most readily eaten are sweet clover, oxeye daisy, sow thistle and Canadian thistle. These are all eaten in their green state, and if cured in hay before the stems become woody they are eaten in preference to timothy hay. Some years ago a neighbour whose ewes were quite fat told me that they received no grain, but were fed upon clover hay with wild peas or wild vetches mixed. This weed makes very fair sheep feed when cured as hay. Last year I seeded down a field that is so low that weed seeds are brought to it each spring by floods, as the snow is going off. Along with the clover and timothy there came up a large quantity of sweet clover and many other kinds of weeds. So dirty was it that I cut the entire crop the last week of June and destroyed it by fire, I then turned my sheep into the field and was surprised to see that they ate the weeds as readily as the timothy pasture. A year ago on the same field my sheep lived for several weeks in the early spring on sweet clover that grew on the river bank. I notice of late years that weeds are becoming more prevalent in our section than heretofore, and I think it is largely due to the fact that farmers are not keeping sheep as they used to.'

John Campbell, Woodville, Ont.—'The sooner a flock of sheep, good of its kind, is kept on practically every farm, the sooner will the income be materially increased, with the least cost for labour; and that not alone because of the direct profit, but also because of the very important part a flock plays in keeping weeds under control. At an institute meeting in western Ontario last winter, one farmer gave his experience along this line. Until some ten years ago he kept sheep, had a clean farm, and weeds were nearly unknown. Following the fashion set by some of his neighbours, the sheep were sold, and soon after weeds demanded constant attention. Bad grew worse, until it was determined to stock up with a flock. The sheep came and in a few years the weeds were once more under control. That is a fair sample of reports from members of flock owners where sheep were utilized as weed subduers.'

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Young Weeds Relished.

John Jackson, Abingdon, Ont.—'I might name a few of the noxious weeds that sheep will readily eat as follows: annual sow thistle, oxeye daisy, rag weed, wild mustard, wild vetches, and, even Canadian thistles when young and tender. They will also eat the buds and flowers of thistles when in the latter stage. I believe sheep will eat about ninety per cent of all the noxious weeds that grow on the farm.

'The best way to handle sheep to give best results in destroying weeds, is to put them on when the weeds are young and tender, allowing them to pick everything close and bare; then change to other pasture, allowing the weeds to get a fresh start. Keep up this alternate system so the sheep will get the weeds in the tender stage of growth.'

Wm. Clark, North Wiltshire, P.E.I.—'I could not begin to give you a list of all the weeds sheep destroy. They will keep down all common weeds except thistles, but of course they will not eat the weeds completely if they get all the grass they want. I believe they will keep down all the weeds on any farm.'

W. G. Pettit, Freeman, Ont.—'As weed exterminators, sheep are very useful, as they appear to be very fond of nearly all kinds of weeds except Canadian and Scotch thistles. We find them very useful in the apple orchard to pick up the wormy apples. Some apple growers think pigs or sheep running in an orchard do as much good as spraying for many kinds of insects.'

R. H. Harding, Thorndale, Ont.—'I find sheep the best weed destroyer that exist. I know of no weed they will not eat. They relish milk weed and burdocks, and will also eat rag weed and oxeye daisies when short of food. In fact there is scarcely a weed that will be permitted to go to seed in the sheep pasture if a flock has access to it constantly from the time the weeds commence to appear.'

J. W. Widdifield, Uxbridge, Ont.—'The claims made for the sheep as a weed exterminator are well grounded. Although not altogether omnivorous, there are, I think, very few weeds that the sheep will not eat if allowed access to them in their tender stages of growth. Their chief value in this connection is in preventing from seeding the annual and biennial weed plants until they have lived their time, and the few in this class that they object to, such as the various burrs, mulleins, &c., are not hard to deal with in other ways. Regarding the sow thistle, either annual or perennial, it is claimed in this locality that sheep are particularly valuable in their destruction.'

H. Arkell, Arkell, Ont.—'Sheep eat ninety per cent of the weeds that grow. They are very fond of the following: Wild mustard, summer cockle, rag weed, red root, sow thistle, bird-clock, red and English dock, and when pastures are bare they will eat Canadian Thistle.

Sheep Help to Clean the Corn Field.

Telfer Bros., Paris, Ont.—Too much cannot be said in favour of the sheep as a weed exterminator. Rag weed is very common throughout the country, and I am of the opinion that were more sheep kept this weed could be practically put out of business, as they are fond of it in its earlier stages of growth.

I have had good results in pasturing a few lambs in the corn fields. They eat many of the weeds and do little or no damage to the corn. Our observation leads us to conclude that farmers who keep sheep have very much cleaner farms than those who do not, and this we attribute to the fact that scarcely any weed escapes them even if pasture is plentiful.'

James Bowman, Guelph, Ont.—'Since I came to this farm, upon which was growing considerable blue weed in one field, I have noticed that when sheep have access to that field from early spring that this weed is kept closely cropped and never allowed to go to seed. They are very fond of burdocks and dandeloins and will brouse

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off willows and other scrub growth while young and tender. There is no weed that sheep are more fond of than wild mustard, they prefer it to almost anything else in the shape of pasture.'

John W. Laidlaw, Wilton Grove, Ont.—'In my opinion there is no other animal on the farm that can compare with the sheep in the two-fold purpose of fertilizing land and cleaning it of weeds. According to my observations the principal troublesome weeds that are consumed by sheep are rag weed and foxtail. These weeds appear in the stubble after harvest, and if a flock of sheep is allowed to run on the field the weeds, with all their seeds, soon disappear, at the same time the field is being fertilized.'

Wild Mustard, Good Sheep Feed.

T. Hardy Shore, Glanworth, Ont.—'There is no doubt that sheep help greatly in keeping down weeds, but I am sure it is a mistake to keep sheep continually in a weedy field. They should be changed off to a clean field every week or so, then they will attack the weeds with vigour when turned fresh on them. If I had a very bad field of say golden rod, or any strong growing weeds of that kind, I would hurdle them on parts of it and turn off on clean pasture, as we can't expect sheep to live on weeds alone. Among our worst weeds that sheep would help to eradicate I would mention: golden rod, lamb's quarters, ox-eye daisy, rag weed, wild raspberry, wild carrot; mustard, elder berry, Michaelmas daisy, and a great many others. If I had a field infested with wild mustard I would make money out of ploughing and working it down early in the spring, then turn on sheep after it had grown eight inches high, then plough and work down and repeat with sheep; do this several times during the summer, in this way lessen the mustard and get feed enough each time to pay for the work. Mustard is as fattening as rape, only one cannot grow so much of it.'

Sow Thistle Overcome by Sheep.

J. W. Clark, Cainsville, Ont.—'As weed exterminators sheep have no equal, being very fond of nearly all weeds. There is only three or four weeds they will not eat readily, namely: toad flax, orange hawk weed, and these they will eat if pasture is not very plentiful. They are very fond of the perennial sow thistle. While I have not had experience with this weed on my farm, while going through the province on institute work many farmers have claimed that the sheep would completely eradicate this most troublesome weed in pasture land, keeping it nipped off so close to the surface that it could not exist for any great length of time. The oxeye daisy is another weed that sheep will keep in control on pasture land. Rib grass, sheep are very fond of and will keep in check. The rag weed can be kept from seeding after the crop is harvested by a good flock of sheep, they will eat the tops off if the pasture is not too plentiful. Too much cannot be said in their favour.'

A number of other correspondents substantiate in a general way the information contained in the above letters. Others state that their land is kept sufficiently clean of weeds by the sheep as to render it impossible to make observation upon the kinds of weeds eaten by this class of stock. This latter is probably the strongest evidence one could have of the value of sheep as an aid to clean farming.

Ragwort—The Source of Pictou Cattle Disease.

Certain plants that are prejudicial to the health of other classes of stock may be eaten by sheep with no apparent risk or inconvenience. The most conspicuous example of this class of weed is ragwort (*Senecio Jacoboea*), a plant very prevalent in Prince Edward Island and counties of Nova Scotia bordering on the Northumberland Straits. Through experiments conducted on a large farm at Antigonish, Nova Scotia, by the Health of Animals' Branch of the Department of Agriculture, it was discovered a few years ago that the fatal Pictou cattle disease is a direct result of

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the continued eating of this weed in its dried state. Further experiments have proved not only that sheep are not harmed by eating ragwort, but they enjoy it as a diet to such an extent that the plant soon disappears from an infested field when pastured by a flock of sheep of sufficient numbers to adequately cope with the vegetation. From information already secured it is evident that while this weed exists as at present over the infested areas, cattle raising cannot be carried on without careful precaution and great risk. Being widespread over rugged hillsides, wood lots and other untillable areas, the only practicable method of eradication is through the agency of sheep. Fortunately the country infested is well suited for sheep raising, being capable of producing an abundance of winter feed, while the hilly pastures and other rough lands are admirably adapted to this class of stock. As weed eradicators, sheep can perform a service of great value to the ragwort infested areas of the maritime provinces.

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ANIMAL ENEMIES OF THE SHEEP.

The Pestiferous Dog.

Fortunate is the sheep breeder who is not from his own experience compelled to regard the roving dog as the natural enemy of the sheep. Many excellent flocks have been ravished and ruined by sheep-killing dogs, and their owners discouraged in the keeping of sheep. For the decrease of sheep in all parts of Canada the annoyance and loss from dogs is given as the chief cause. There is perhaps no experience on the farm so heart-breaking and vexatious to the shepherd as to find in the morning that the dogs have been amongst his flock. Upon going to the field he finds a number of the choicest ewes torn and bleeding or killed outright; others with their forearms so chewed and thighs lacerated as to render them hopeless cripples. Those not bitten are so exhausted, frightened and upset as to be practically ruined for further usefulness. For weeks they will start and rush about from the least unusual sound, until restful feeding and thriving is out of the question. Nor does time correct the evil. Regular breeding is interfered with and losses at lambing time are greatly increased. Even though hundred per cent actual damages are made good by municipal appropriation for the killed and injured animals, the loss is not nearly met. The writer can speak from experience on this point. On a single night more than a score of breeding ewes, nearly all imported from Britain, were bitten or torn. While the immediate fatalities did not exceed half a dozen head, the damage was estimated to be sufficiently large to warrant the council in granting five hundred and twenty-five dollars—to the council a large appropriation, but to the flock owner a very inadequate compensation, not greater in proportion than one thousand dollars' insurance on the loss of a five thousand dollar property. The destruction occurred early in the summer while the lambs were young. The ewes went off their milk, and being restless and timid failed sadly in condition. Many did not get in lamb in the fall, and a number that did gave endless trouble with each succeeding lambing time from unnatural presentations and losses therefrom. The once valuable flock selected in Britain and at home at great expense was practically ruined.

The experience described is not overdrawn, as very many sheep owners can affirm. Unfortunately only sheep men can appreciate the extent of injury to the industry effected by dogs, with the result that adequate protection by legislative bodies is practically impossible to secure. Even the small tax of one dollar for dogs and two for bitches is looked upon by many as an unjustified hardship on the poor man who so frequently likes to harbor two or more useless canines. The people who keep the dogs have no interest in the sheep, and as they are vastly in the majority, measures calculated to restrict the freedom of the dog are almost invariably shelved on first presentation, and afterwards killed or modified until practically useless.

Is it not time for sheep owners and others interested in the industry to unite upon this question, which is so closely allied to successful agriculture? During the score of years preceding 1901 the sheep stock of Canada decreased almost half a million head. The chief cause of this falling off was undoubtedly the worrying dog. That such an industry should be handicapped and in many cases ruined by, not the valuable dog that his owner cares for, but the pestiferous cur that is not only useless but a detriment to a district, is a situation difficult to understand. And still adequate legislative protection is denied the sheep. Sheep are seldom or never killed during the day time, which fact greatly simplifies the working out of a satisfactory measure. A dog away from home and unattended during the night hours is a dangerous animal, and for the purpose of sheep protection should be regarded as a wild beast and treated accordingly. It should be the lawful privilege of every one to hunt down and destroy the dog that leaves his home to rove the district during the hours of night.

It is true that most of the provinces have on their statute books Acts for the

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protection of sheep, but in no case does the sheep receive such consideration as the wild deer of the forest. According to the game laws of certain provinces:

'No hounds or dogs accustomed to pursue deer are allowed at large where deer are found, during the close season for deer.'

The law in Ontario further provides that:

'Hounds or dogs running deer during the close season may be killed on sight by any person, who shall not be liable to damage for so doing.'

So far as the legislation for the protection of sheep is concerned we have made little or no advance for several centuries. We find that in 1648 the general court of Massachusetts made an order in which the following appears:—

'If any dogge shall kill any sheepe the owner either hange his dogge forthwith or pay double damages for the sheepe, if ye dogge hath been seen to course or bite any sheepe before, not being sett on, and his owner hath notice thereof then he shall both hange his dogge and pay for the sheepe.'

This old regulation was calculated to protect the sheep in the same way that our present game laws protect the deer, while the sheep in many municipalities are receiving a much less serious consideration. In the twentieth century it would appear as though the dog industry receives greater consideration by legislative bodies than that of the sheep.

Methods of Protection.

While many sheep raisers have dispersed their flock because of the dog nuisance, and others for the same reason have hesitated taking up the industry, there are many who have discovered successful methods of guarding their flocks from attacks.

The employment of half a dozen sharp-sounding bells attached to the necks of individuals is common practice. This, however, is not always successful. Flocks wearing this supposed safeguard are occasionally attacked and its members worried, but if the sheep can approach within earshot of the dwelling, the shepherd is likely to be aroused as he is ever on the alert in regard to his sheep.

A troublesome custom, but considered the best safeguard by many, is to bring the flock at night to a field or plot adjacent to the barn. Unless provision is made for feeding in these quarters the sheep cannot thrive satisfactorily. They are early to rise, and should not have to wait long after daylight for the morning meal, especially if this has to be gathered from a sparse pasture at some distance from the sleeping place. This plan has points to commend it if the feeding difficulty is overcome. All sheep should be seen once daily, and twice is even better. To provide night pasture two plots should be sown with suitable fodder and the flock given access to these alternately, giving each a chance to grow up in its turn. If these are fenced with dog-proof fence the surer will be the protection. A modern woven wire fence 5 feet 6 inches high, with cross wires not more than 5 inches apart, and having a barbed wire at the top and at the bottom close to the ground will keep out dogs, provided no objects are left that would be of assistance in jumping over.

An extensive sheep raiser recommends the use of a dog-proof woven wire inclosure, locating it in the pasture and moving it from place to place on knolls needing fertilizing. It is suggested that five dollars worth of material would provide a moveable pen large enough for fifty sheep. The labour of inclosing and liberating the sheep would be much less irksome than milking cows or feeding hogs.

Still another plan is to give the flock access to the home building during the night, or at all times, if convenient, by leaving openings from the field to a lane leading to the barnyard. If the salt box is kept at the building the sheep will regard that point as the one centre of meeting, and to this they will run when molested in the field. It is very important to have the gap immediately at the corner of the pasture nearest the barn. If at the side of the field, the sheep, when being driven, are likely to miss the gap in their terrified flight from their pursuers.

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Predatory Animals.

In many sections of Canada, more particularly west of the Great Lakes, the sheep-raising industry is seriously injured by the depredations of predatory animals. The most common of these are the coyote, the timber wolf and the panther. The coyote is troublesome in each of the western provinces, the timber wolf is the cause of loss in Alberta and British Columbia, while the ravages of the panther are confined to the Pacific province. In addition to these the brown bear occasionally takes a lamb in back sections of Quebec, New Brunswick and Nova Scotia. The coyote or prairie wolf is especially destructive to young lambs, but when once the habit of sheep killing has become fixed unprotected flocks in coyote-infested districts suffer from their depredations.

A number of remedies for the coyote nuisance have been adopted, with more or less success. Close, high wire fencing is effective, but quite expensive. The ordinary bounty of $2 for mature coyotes and $1 for pups helps to reduce the number, but the systematic and careful use of poison at the proper seasons is the most effective remedy. The Board of Sheep Commissioners of Oregon, a body reporting estimated annual losses of 150,000 sheep in the State by coyotes, has worked out a number of practical methods for destroying these pests. The following quotations are from Bulletin No. 2 issued by this board:—

'Granting that it will be possible for the one thousand sheep men to average the destruction of ten coyotes each for the winter months of one year, and approximating that half of this number of destroyed coyotes will be pregnant females that would have given birth to an average of six pups each during the following spring, this alone would account for forty thousand less coyotes in the fall of the same season.

'For coyotes, use No. 3 spring steel traps fitted with swivels and attached to a log or stone weighing thirty pounds upwards. It is well to see that the trap is placed on a level with the surface of the ground and the jaws of the trap are covered over with a piece of thin paper, and this can further be covered with particles of fine earth; this can be further masked by the sprinkling of water upon the earth-covered trap. The use of artificial scent will here be found useful.

'When hunting with hounds the dogs should be inclosed in a wagon fitted with spring doors that may be tripped by the driver, thus allowing the dogs to make their exit and quickly enter the chase.

'During the month of May the young coyote pups may be heard in their dens and burrows, and can be easily destroyed by digging them out, or by the destruction of their mother.

'This method is more generally used than all others, but the great fear which the coyote has of all hunters prevents this method from being highly practical.

Poisoning.

'Of all available methods for coyote destruction, poisoning is admitted to be the most practical and efficient measure, and no poison has been so successfully used as two grains of dry sulphate of strychnine inclosed in two grain gelatine capsules. The gelatine capsules filled with strychnine after being wiped free from any external appearance of strychnine should be further protected from the dissolving effects of moisture, contained in the air and in the juices and water contained in the several materials used as a bait, by covering same with several coats of tallow. This may be best done by dipping the capsules in melted tallow.

'Several materials are highly recommended as being useful for coyote bait, and are used and prepared as follows:—

'(*a*) Lard, beef suet and tallow. Cut these into pieces the size of a walnut and insert therein one of the capsules of poison and securely close the cavity.

'(*b*) Particles of liver. Cut into pieces the size of an egg and insert therein by means of a slit one of the capsules of poison in each piece.

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'(*c*) Eggs, into which one of the capsules of poison has been placed by means of a small opening in the end.

'(*d*) Prunes, into which one of the capsules has been inserted.

'It is necessary that all materials used as bait to contain poison should be handled at all times with either forceps or gloved hands, as coyotes can easily detect human scent when bait is touched by persons not wearing gloves.

'Eggs and beef suet will be rendered more easily found both by the coyote and parties wishing to remove the same from the range if the bait is covered with blood. This is especially recommended when the snow covers the ground.

Precautionary Measures.

'Eggs and prunes are said not to be readily eaten by domestic dogs. Beef suet, lard and tallow can be rendered less likely to be picked up by dogs if holes are bored in irregular pieces of wood and the suet, lard or tallow containing the poison placed therein. These offer the advantage in that they may be distributed from horseback along the decoy trails and in the vicinity of the decoy bait, and in the morning can be removed from dangerous exposure. Lard and tallow should be easily used in this manner.

'All sheep men shall exercise great care in putting out poison, and take every reasonable precaution to prevent it from being taken by dogs or other domestic animals. All poisoned carcasses that have lain so long that they have ceased to be useful, or where they are so situated as to be easily accessible to dogs, should be destroyed by burning. (Unless buried at a sufficient depth the bones of such carcasses may be uncovered by badgers, and many months afterwards be the cause of poisoning a valuable dog.) Poison should never be placed nearer than one-half mile of any highway or road or any residence or house. If placed nearer than one mile of any house or dwelling the occupants thereof should be first notified. Do not put out poison on lands or ranges other than those owned, leased or occupied by you to the exclusion of other persons, or unless you have the express consent of the lawful owner or possessor thereof. Do not place poison near enough to any road or highway to attract dogs passing along. Poison should rarely ever be inserted in meat containing bone. If a carcass should be poisoned be sure and completely destroy all remaining bones by burning. Written notices should be placed in conspicuous places near carcasses and about one-fourth mile therefrom when practicable. Dogs should be muzzled or tied up during the poisoning season. All small poisoned baits should be picked up, after using a reasonable length of time, and destroyed. After the season is over all poisoned bait should be destroyed, whether old or not. Be extremely cautious and careful at all times in the putting out of poison, and success will crown your efforts.'

The Statutes in Western Provinces Respecting Exposing Poison.

Regulations in Manitoba.—In the province of Manitoba the exposing of poison in any shape for wolves or coyotes is prohibited by law under a penalty of a maximum of $50 and a minimum of $20. In the province of Manitoba, therefore, coyotes and wolves must be destroyed by other means than by poisoning.

Regulations in Saskatchewan.—There is no provincial law in Saskatchewan regulating the use of poison for coyotes or other animals. The ordinance governing the poisoning of animals of the Northwest Territories was repealed in 1897. Persons who expose poison in Saskatchewan are liable for damage and may be dealt with under the Criminal Code.

Regulations in Alberta.—Following is a copy of an Act assented to by the legislative assembly of the province of Alberta in March, 1908:—

1. 'Except as herein otherwise provided, no person shall put out poison in that part of the province described in section 2 hereof.

2. 'In that portion of the province lying to the north of the fifty-fifth degree north latitude a person may put out poison for the destruction of wolves upon satisfying an

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officer or constable of the Royal Northwest Mounted Police stationed either at the village of Athabasca Landing or in the portion of the province in this section mentioned (or if there be no officer or constable of the Royal Northwest Mounted Police in such place or territory, then any other public officer or constable therein) of the necessity or advisability of so doing, and obtaining the written permission of such officer or constable to do so.

(2) 'Such written permission shall specify the area within which the poison may be set out and no poison shall be set out outside of the area so mentioned.

(3) 'The permission in the last preceding section referred to may be in the form set out in schedule A to this Act, but no such permission shall be given for a longer period than six months in any year.

(4) 'No person shall set out poison, except it be upon his own premises, within one mile of any public road or trail, or within two miles of any dwelling house or camp, nor shall poison be set out unless it is mixed with grease and placed in a hole or hollow in a piece of timber or other material, or is placed in a vessel.

(5) 'Every person guilty of a contravention of the provisions of this Act shall be liable to a penalty of not more than $100 on summary conviction.

'SCHEDULE A.

'Permission to put out Poison.

'A. B., who resides at. . . . . .is hereby permitted to set out strychnine or other poisons for the purpose of destroying wolves within the following areas, namely:. . . . . ., provided that such poison shall not be placed within one mile of any public road or trail or within two miles of any dwelling house or camp except on the premises of the said A. B.

'This permission is only good for six months from the date hereof.'

Regulations in British Columbia.—In British Columbia the Poison Act as amended in 1903-4 provides:—

'Every person who shall place any poison outside of his own building or upon any land possessed by him, for the destruction of noxious animals, or for any purpose whatever, shall give notice to all persons or families residing within two miles of the place where such poison is placed by posting notices in five of the most public places within two miles of where said poison is to be put out, and said notices shall be posted for at least twenty-four hourse before the setting out of any poison, as before mentioned.'

Timber Wolves, Bears and Panthers.

Timber wolves and panthers are sly and difficult to trap. The most popular method of destroying these is to hunt them with dogs and guns. The substantial bounty offered for their heads by each of the provinces proves an incentive to hunters to seek this class of game.

Loss from bears is likely to diminish with the removal of timber and the attendant extension of agriculture. An enthusiastic sheep raiser residing in northern Quebec finds it profitable to bring up his flock to the barnyard during the summer and fall months. The residents of this vicinity are ever on the alert for bears, with the result that the number is being reduced each year. Steel, bear traps are used in isolated spots, but these are objected to because of the danger to farm stock. The 'dead fall,' intelligently used, each year accounts for a number of bruins, but the dog and the gun directed with the judgment of an experienced hunter are probably the most effective weapons of extermination.

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THE INDUSTRY IN THE DIFFERENT PROVINCES.

Prince Edward Island.

The sheep industry is an important branch of agriculture on Prince Edward Island. The soil and the climate are highly adapted to sheep raising, as evidenced by the quality of many of the Island flocks and the excellence of the mutton produced. As in other provinces, the numbers decreased during many years prior to 1906, when some improvement was shown. The returns for 1907 indicate an increase of about 8 per cent over the previous year. Both wool and mutton have so materially improved in value that flocks are increasing in numbers and enlarging within themselves as rapidly as the natural increase will allow.

While many of the flocks have white faces and long wool, the use of Down sires is becoming very popular. The close fleece of the grade Down is well suited to the moist climate of fall and spring, and the compact carcasses are admirably adapted for the market requirements. The census returns show that of the thousand head of pure-bred sheep on the island about 55 per cent are Shropshire, 15 per cent Leicester, 5 per cent Cotswold, 5 per cent Oxford and the balance Southdown and Lincolns about equally divided.

The soil, a light red loam, naturally dry under foot, is admirably adapted for sheep. It is easily worked and when well farmed produces abundant crops of all classes of sheep fodder. Hay, oats and roots do particularly well, and with these foods sheep may be grown to perfection if the foundation stock is right and intelligence is exercised in breeding and treatment.

Island agriculture is suffering from the constant growing of hay and oats without adequate returns of manure. If these foods were fed to sheep and turned off as mutton and wool the fertility of the soil would be rapidly increased until in a few years the poorest farm would be yielding profitable crops. The foundation stock may consists of young healthy ewes of any grade or colour of face preferred or obtainable. If on these pure-bred sires of good mutton form are bred and the produce well cared for, the males wethered and the culled females fattened for the market, a valuable yearly revenue would be secured from the flocks, against which there need be comparatively little expenditure for labour and buildings.

From 1902 to 1906 between 13,000 and 14,000 lambs were shipped each year, while in 1907 the number had increased to about 20,000. Unfortunately the quality is claimed to have been steadily going back. A prominent Charlottetown butcher reports that the carcasses were on an average from 7 to 10 pounds each lighter in 1907 than previously. Prices have been steadily advancing. Some years ago lambs were bought at $1.50 each, and only the best taken. The price per pound was 2 cents for all over 60 pounds. In 1907 as high as 5¼ cents was paid for ewe and wether lambs over 70 pounds and one cent less for rams. In spite of this great difference in price the percentage of ram lambs was about 10 per cent greater than in 1906, when one dealer deducted $572 for rams, while the following year the farmers of the Island lost about $2,000 on their lambs from reduced price alone, to which may be added many hundreds of dollars from loss of weight. The dealers do not want to handle ram lambs at all, and the sooner sheep raisers realize this and guard against it the earlier will their industry prosper. The value of lambs shipped to the American market in 1906 was about $65,000; with the increased price and increased number about $75,000 worth were sent over in 1907. If sheep raising were undertaken earnestly and conducted in a business way by the general farmers of the Island, the agriculture of the province would rapidly grow in prosperity.

Nova Scotia.

No province of Canada is better adapted to the production of mutton and wool than is Nova Scotia. In the province there are over a million acres of pasture land,

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a great deal of which is sandy, rocky or gravelly, rolling up-land. Much of it is covered with short, nutritious, native grass intermingled with white clover, yielding a rich herbage upon which sheep thrive exceedingly well. Soil and climatic conditions in Nova Scotia are extremely favourable for the growing of summer, fall and winter sheep feed, such as grass, rape, roots, clover and mixed hay. As sheep require less grain feed than other classes of farm stock, they are particularly well suited for a province where the growing of cereal crops is not now and likely never will be a very strong factor in its agriculture.

Near the sea, where the weather is at times damp and foggy, a compact, medium sized sheep, with a close, dense fleece, is better adapted than a sheep with a more open fleece. In sheep, as in any other stock, good results seldom come by chance. It requires steady, persistent effort to attain the end in view. When pure-bred compact males of one breed are used and a continuous fixed course of breeding followed, in a few years a very ordinary flock will be so changed that they will have the conformation and appearance of pure-breds.

With the price of lambs at five cents per pound, weighed out of the pasture, and tub-washed wool selling at 25 cents a pound, a very common ewe between fleece and lamb returns the Nova Scotia farmer from five to six dollars a year. With good breeding, careful selection and liberal feeding, no branch of the live stock industry in Nova Scotia is more profitable than sheep raising. The neglecting of two points in sheep management, however, causes serious loss: ram lambs are not castrated, and too often the ticks are not destroyed. Lambs should be castrated when between ten and fifteen days' old; this would add at least fifty cents to the value of the lamb, as then they need not be disposed of so early in the autumn. If the practice of castration became more general it would relieve the market from becoming glutted in the fall, as so often happens when too many ram lambs are crowded on to it.

No flock can thrive or do well if the ewes and lambs are pestered with ticks. Early in June is the best time to get rid of these pests. About ten days after the ewes are shorn the ticks will have taken shelter on the lambs. If the lambs are then dipped it will be the means of so thinning out the troublesome vermin that the flock will thrive in peace and contentment.

In destroying noxious weeds and keeping tillable land clean, there is no other method so easy as that of pasturing with sheep. In Nova Scotia, particularly, sheep have a peculiar value in this regard. The weed known as ragwort has become a serious menace to cattle raising in the province by causing Pictou cattle disease. Sheep relish this weed, and receive no injury from it. From experiments carried on for years under the direction of the Veterinary Director General on an infested farm, it would appear as though sheep would in time entirely exterminate this plant. Apart altogether from the advantage of rearing sheep in large numbers as a profitable branch of agriculture, for the purpose of making it possible to conduct the rearing of cattle successfully, the keeping of sheep in the ragwort-infested district cannot be too strongly urged.

For a score of years ending 1904 sheep rearing in the province gradually declined, the falling off amounting to 10,000 head. Since then an improvement has taken place, more particularly in eastern Nova Scotia and Cape Breton. At present the number is about 385,000 head. In 1901, when the last census was taken, there was killed and sold sheep and lambs to the value of $119,756. At that time, however, the price of mutton was very low. The annual wool clip is a little more than one million pounds. Of pure-breds there are in the province the following numbers: Shropshires, 600; South Downs, 80; Leicesters, 80; Oxford Downs, 100; Dorsets, 30; Hampshires, 11; Lincolns, 20; Cotswolds, 25.

In the falls of 1906 and 1907 there were taken to the province by the Provincial Department of Agriculture a large number of pure-bred rams which were sold at auction. It is the intention of the government to continue this distribution for a few years. The educational side of the sheep industry is also to be pushed at farmers' meetings.

Nova Scotia has over a million acres of pasture land. Owing to the roughness of

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the surface much of this must remain in permanent pasture. Great tracts of it are on bare, bleak, wind-swept hill sides where dairy cows or even young cattle could barely exist, but where sheep would do fairly well. The most practical way of renovating cropped out land, bringing it back to a profitable state of fertility, is by sheep farming. In some parts of the province there are far too many deserted farms upon which a fair living could be made if sheep raising were made the principal factor in its working. To buy up or lease a number of cheap farms, going into sheep raising extensively, would, if judgment and skill were used in the management, give the owners a better return and a much safer investment than purchasing land in distant countries.

Nova Scotia has a number of well managed woollen mills. The quality of their goods have a Dominion reputation. The development of the sheep industry would give them a larger supply and a better quality of raw material.

There are a great many reasons not mentioned why the sheep industry of eastern Canada should be stimulated and encouraged. It is well worthy of careful consideration.

New Brunswick.

While the agricultural sections of New Brunswick are devoted largely to dairy farming, there are many sections of the province admirably adapted for sheep raising. According to the latest census returns the province has one cow for each two acres of pasture land, and where organized dairying is the leading industry there is little reason for largely extending the keeping of sheep. On rugged, or rolling land not already returning a profit from cows, the sheep stock might well be greatly increased.

The mutton produced in New Brunswick, as in the other maritime provinces, possesses a grain and flavour of unusual excellence. This fact is recognized by many of the best paying markets, with the result that buyers from Boston and New York are early on the ground each autumn contracting for lambs for the fall trade. Western Canada has also entered the field for New Brunswick lamb, and early in the summer of 1907 placed an order with a local buyer for several carloads to be supplied during the autumn. Provided the quality of the product is kept up and improved there is very little danger of a decrease in the value of the maritime lamb, even though the supply is greatly augmented. The needs of the market already looking to New Brunswick are not readily supplied, in fact there is every probability of a constantly growing demand from these quarters.

The Dominion census taken in 1901 shows the sheep stock of the province to have numbered 182,524 head, a decrease of 417 since 1891, and 38,222 less than in 1881.

Owing to the increase of values of both wool and mutton during the past few years the farmers in some sections of the province are increasing their flocks. According to the provincial census report the numbers had increased to the extent of nearly 70,000 head since 1901. The use of pure-bred males is also increasing. With a view to encouraging this improvement the provincial government purchased 100 pure-bred sheep in Ontario, and sold them at auction in September, 1907. They were purchased principally by agricultural societies, who resold to members, so that they were fairly well distributed throughout the province. With the improvement that is sure to result from the better breeding, the industry is destined to go forward. What is needed is better care of the flocks in the direction of providing changes of pasture in summer and a variety of suitable fodder crops for use during the housing season. With due attention to these, the wethering of the grade males, and the judicious culling of the ewes the agriculture of New Brunswick will have a valuable branch, year by year growing in importance, in the sheep raising industry.

Quebec.

The early sheep of the province of Quebec came from France. The first ship ment was made in the middle of the seventeenth century; others followed from time to time during the French régime, and for nearly a hundred years afterwards no other

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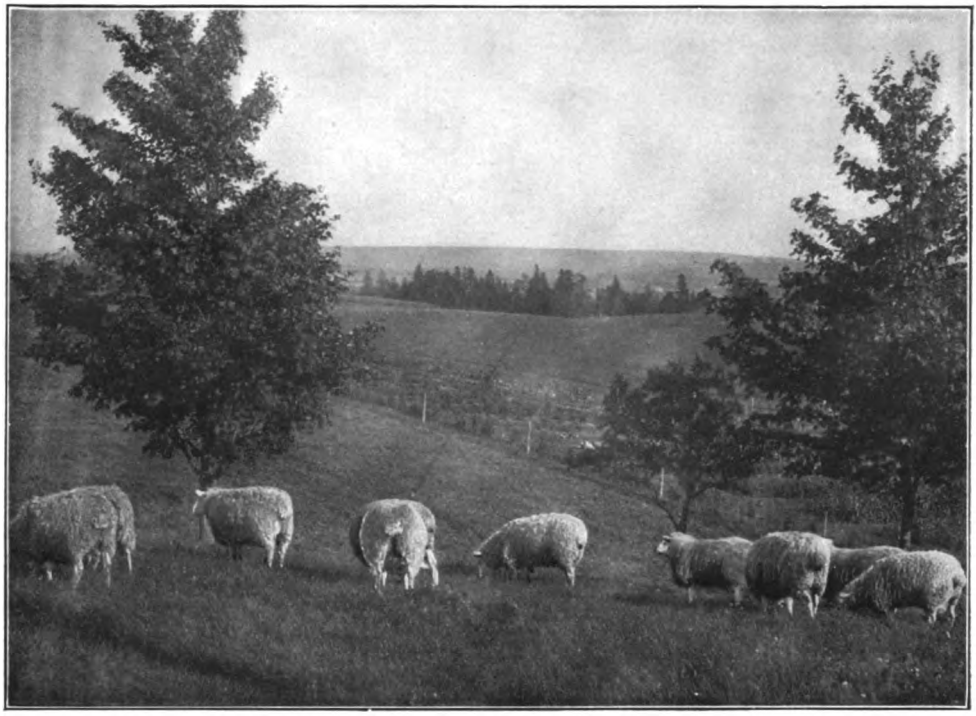

Fig. 61.—Group of Flock Headers in Nova Scotia.

2514—p. 88. Fig. 62.--Southdown Flock near Pictou, N.S.

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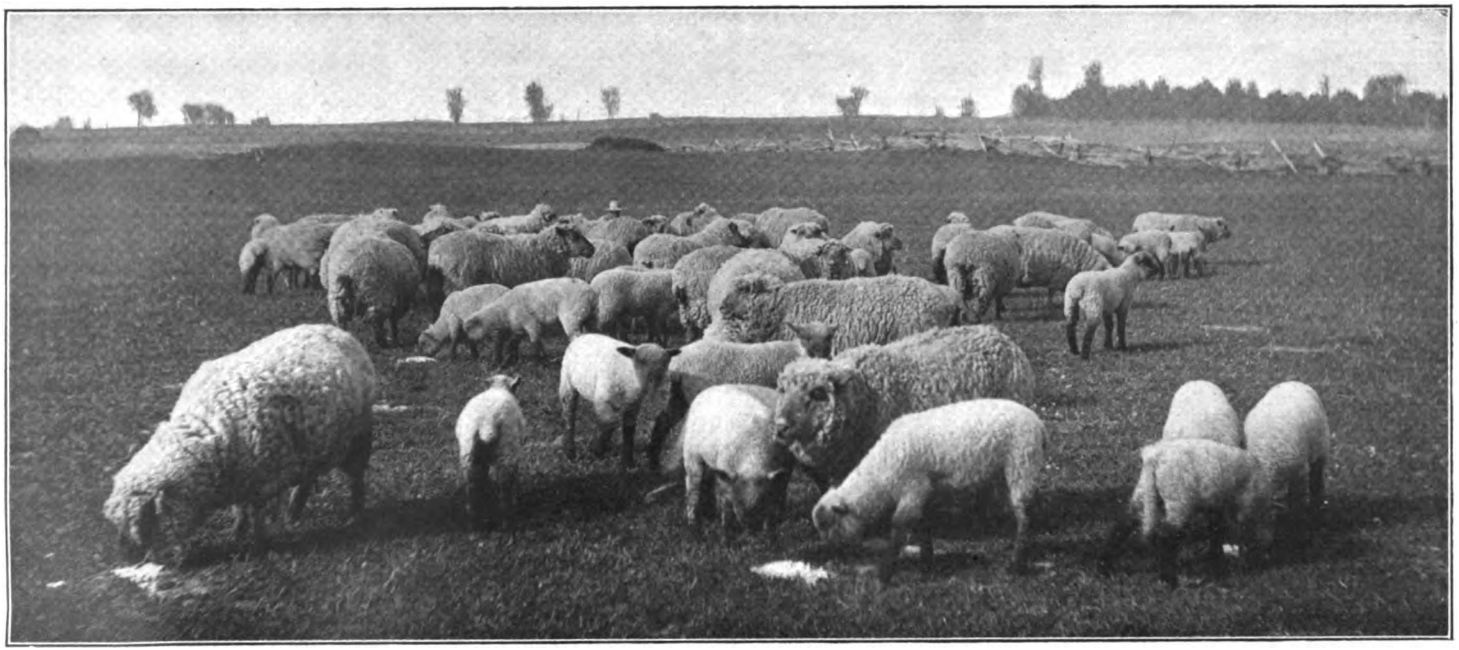

Fig. 63.—Salting time on an Ontario Farm.

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sheep were brought in. These French sheep were small, and much resembled the Cheviot in size and conformation, particularly the shape of the head, while the quality and weight of the fleece were much the same.

Toward the end of the eighteenth century colonies of United Empire Loyalists that came into what is known as the Eastern Townships brought with them from New York, Pennsylvania and other eastern states such sheep as were common in the districts from where they came. These as a rule were grades of the leading English breeds in those days, including Cotswold, Leicester, Hampshire and Southdown. They were chiefly white-faced, however, and are said to have been very fair mutton specimens that sheared from three to five pounds per head of wool of medium fineness.

Prior to 1850 very little is definitely known of the sheep industry of the province. At that time nearly every farmer kept a small flock, from half a dozen to a dozen or fifteen head, that is to say as many sheep as were necessary to furnish enough wool to make home-spun clothing and blankets for the members of the family.

Around 1850 some English-speaking gentlemen farmers in the vicinity of Montreal and in the Eastern Townships brought out importations of Cotswolds and Leicesters from Britain.

In the early sixties the Board of Agriculture of Lower Canada was founded. This board shortly afterwards organized county agricultural societies and the first provincial exhibition. At this exhibition several flocks of Leicesters and Cotswolds were shown. The farmers who saw them admired them very much because they were large and fat. They imagined these must be more profitable than their own little sheep, never for a moment thinking that these big fellows required much more feed and better treatment. They were unaware that they could not thrive on the bare pastures and the small amount of coarse winter feed that sufficed to maintain the hardy little natives. From that date onward Cotswold and Leicester rams were bought by the progressive farmers to use on the small native ewes. The Leicesters went chiefly to the Eastern Townships, while the Cotswolds were bought by the French farmers in the Montreal district. Up till 1880 the French sheep were the only breed to be found on either bank of the St. Lawrence from Three Rivers eastward.

Shropshires and Southdowns found their way into the province about 1880; some were imported from England, but the majority came from Ontario. A decade later a few Oxfords and Lincolns were brought in, but their number is still very limited. At the present time there are quite a number of pure-bred Cotswolds, Leicesters and Shropshires in the province. Up to 1906, when the provincial sheep records were transferred to Ottawa, some ten thousand sheep had been recorded. Fully half of these were Leicesters, about one-quarter Shropshires, one-fifth Cotswolds, the remainder being Lincolns, Oxfords and Southdowns. Under the national system of registration a large proportion of those whose pedigrees could be traced to importation have been recorded. Grades of these breeds can be seen in a great many parishes, but unfortunately not in all.

The breeders of pure-bred sheep have a limited market for their stock. As compared with the Ontario breeder, the Quebec breeder sends few animals to the United States. This is particularly true in the case of the French-Canadian, who does not communicate in the English tongue with the outside world. His market is therefore largely confined to the province. Unfortunately the demand here is not nearly so great as the condition of the commercial flocks would indicate. Improvement in this respect is evident in many quarters.

The progress of the sheep industry has not been proportionate to the increase in population nor the general progress of agriculture. Rather it has gone backward in regard to numbers, and in some districts quality also. Many things have contributed to this condition of affairs. The enormous growth of the dairy and its sister industry, hog raising, have been two potent factors. Coupled with these goes the cry that sheep are hard on pasture. Better times, cheaper cloth and for several years the low price of wool have been other factors. To these may be added a deplorable lack of knowledge of sheep husbandry generally, with its attendant train of mistakes and failures in breeding, care and management. Some districts have for years inbred so closely that

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to-day their sheep are run out in size, bone, wool, flesh and early maturing qualities. These sheep bring the lowest price on the market, and would not be bought at all if the demand was not in excess of the supply. Ram lambs are another source of great loss. From three-quarters to one and one-half cents are frequently deducted in the late fall from the price paid for wethers of equal weight. One of the largest firms of Montreal sheep buyers reports that not one-fourth of the ram lambs are castrated. A lack of preparation for fall finishing is another source of loss. In grading up the small native sheep the largest breeds should not be used in the cross. Such a cross is too violent. Where the ewes are small, such breeds as the Southdown, Cheviot or medium sized but well-fleshed Shropshires would likely give better results. These breeds can live on scantier pastures, and will under severe conditions give a better class of lambs and consequently more money.

To-day no province has a better outlook as regards this industry. It has much rough land that is admirably suited to sheep raising. The demand for mutton far exceeds the supply. The prices paid for the inferior sheep and lambs are fair, while good ones are at a premium. Wool is in demand at paying prices, which could be much increased if properly handled. Local demand for good mutton is increasing, while the close proximity to New York and Boston ensures a market at all times of the year. The export trade is almost at the door of the people, and all that is needed for the prosperity of the industry is faith in the business, then a careful study and compliance with its requirements.

Ontario.

The sheep raising industry finds its highest development in Canada in the province of Ontario. It has occupied a prominent place in the agriculture of the province for more than a century. Many of the early settlers brought with them small stocks of sheep from which flocks were developed. The earliest importations of which records are available were the sheep brought in by the United Empire Loyalists, who came from New York, Pennsylvania and New England colonies towards the end of the eighteenth century and settled in districts bordering on Lakes Ontario and Erie. Naturally the sheep brought by these people were those commonly raised in the districts from whence they came. As a rule these were rather rangy, coarse-boned animals, weighing from 100 pounds to 125 pounds and shearing from 3 pounds to 5 pounds of rather fine, short wool. They are said to have been of mixed breeding, containing the blood of the Wiltshire, Romney Marsh, Hampshire, Southdown, Cotswold and Suffolk. Many Pennsylvania Dutch farmers who settled in the province about 1790 brought sheep of much the same general character as the United Empire Loyalists had done, although it is chronicled that the blood of Friesland breeds was rather more evident than that of British sorts.

The flocks thus established were perpetuated largely without the introduction of new blood until about 1830, when immigration from Britain commenced. A small number of British immigrants brought seed stock of the several classes, including sheep, and with these the quality of the established Canadian flocks was much improved.

It will be understood that the flocks of sheep in those days were as necessary to the needs of the people as were the cattle, the former to supply the clothing and mutton, while the latter yielded the milk, the beef and most of the draught labour.

While the blood of the Southdown and the Hampshire was present in the early flocks, the oldest settlers, upon the evidence of their fathers, claim that the common flocks were practically all white-faced, except the few all black sheep that were kept to produce black wool from which the fulled cloth 'Sunday' suits were made. The sheep of the best flockmasters were, as a rule, vigorous animals, with dense fleeces of about the quality of the Dorset wool of to-day. They were chiefly polled, although an occasional one wore horns. In the inferior flocks of those days there was occasionally a black sheep, with white face and feet, and now and then specimens marked similar to those shown in Fig. 31, representing unimproved flocks of the present day.

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EARLY IMPORTATIONS.

Up to the early forties few, if any, pure-bred sheep had been imported into Canada. About the year 1842 a small number of Leicesters and Cotswolds were imported from England, and a few years later the Southdown commenced to appear. From that time onward shipments were landed almost every year. A report of the first provincial exhibition held in Toronto in 1846 states that the exhibits of Leicesters and Southdowns were of excellent quality and well adapted to the country. Two years later, in addition to the two breeds already named, Merinos were shown at the provincial exhibition. The numbers increased year by year until the exhibit at London in 1854 amounted to 400 head, divided as follows: Leicesters, 200; Southdowns, 44, and Cotswolds, 30, the last named being newly imported by Geo. Miller, of Markham. In addition to a small exhibit of Cheviots made that year by Geo. Ruddick, of Northumberland county, the remainder consisted of grades. The following year the show of Leicesters was not quite so large, but the entries of Southdowns, Cotswolds and Cheviots were more numerous than heretofore. The prize winners were as follows:—

Leicesters.—Chris Walker, London; Wm. Miller, Pickering; Geo. Miller, Markham, and Jas. Dickson, Clark.

Southdowns.—John Spencer, Whitby; R. W. Gordon, Paris; R. W. Stanley, Haldimand; Richard Coats, Oakville, and A. Burroughs, Brantford.

Cotswolds.—John Snell, Edmonton; Wm. Smith, Clark; Wm. Miller, Pickering; F. W. Stone, Guelph, and Geo. Miller, Markham.

Cheviots.—Wm. Ruddick, Markham.

A number of these men occasionally showed at the New York State fair and brought away much of the prize money competed for; the entries of pure-breds kept up well. Three years later, 1858, the show of Leicesters numbered 188; Cotswolds, 39; Cheviots, 15; Southdowns, 49; Longwools, not pure-bred, 68; Merinos, 29, and fat sheep, 19. The Longwools, including grade Cotswolds, Leicesters and Lincolns, were magnificent sheep, equal in many respects to the pure-bred classes. The Merinos and Cheviots did not gain ground, but all of the other breeds improved, multiplied and increased in popularity until the sheep industry of the province in the early sixties had become a very popular and profitable branch of agriculture.

To encourage importation the Board of Agriculture in the early fifties resolved to double, and a few years later, to triple the amount of any first prize granted at the provincial exhibition to any animal which had been imported during the year. An increasing number of enterprizing men year by year took advantage of the opportunity to introduce improved blood into their flocks, which by this time had grown numerous and many of them fairly large. County agricultural societies also were taking a keen interest in stock improvement by purchasing and distributing improved males among their members, as for example, in 1854 Grey County Society bought ten rams and sold them out for $285; three years later the Kent County Society paid $320 for 21 rams and sold them for $175. Much good resulted from this public spirited effort.

From this time onward, until about 1870, sheep raising flourished in almost all parts of the province devoted to agriculture. About this period dairying began to receive special attention in the eastern portion of the province as well as in some of the most fertile counties in the west. Fruit growing, too, in counties bordering on Lake Erie and the Niagara river, soon attracted the attention of many away from animal husbandry, with the result that many farmers abandoned sheep keeping. About that date the sheep population of the province began to subside. In 1871 the numbers are given as 1,514,914, which by 1881 had fallen to 1,359,178; in 1891 to 1,021,769, when the industry was at its lowest ebb. Ten years later the numbers had increased to 1,042,431, and seven years later, in 1907, to 1,106,083 head. These figures represent the stocks in the early spring, before the arrival of the season's crop of lambs.

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It will be remembered by sheep men everywhere back in the nineties the sheep industry in common with others was much depressed. This was undoubtedly the result of a period of over-production and financial distress experienced in the United States, which had become the chief market of the Canadian breeder of pure-bred and commercial stock. With the return of prosperity, affording increased purchasing power of urban populations, together with the increase of immigration, the domestic market for mutton greatly improved and wool values enhanced, with the natural result of stimulating the industry. The improvement has not been general over the province. The tide towards dairying and hog raising and away from sheep was not easily stayed, and to this day the profitable and easily cared for sheep is not looked upon with favour by the rank and file of Ontario farmers. In the older settled portions of the province, Prince Edward and Prescott are the only counties showing increased flocks. In northern districts, Muskoka, Nipissing, Algoma, Thunder Bay and Rainy River show increases; while in Manitoulin Island and Parry Sound the industry has just about held its own.

PURE-BRED FLOCKS.

The sheep industry of the province is conducted in two more or less distinct branches, viz., the breeding of pure-bred animals for breeding purposes, and the production of lamb and mutton for the market. The former has from the early years been a prominent industry; in fact nowhere in North America are better sheep of mutton breeds reared than in Ontario. International contests year by year prove this contention. At the Pan-American at Buffalo in 1901, and at the annual International Live Stock Show held at Chicago, championships and many first prizes have been year by year brought back by Ontario exhibitor for home-bred animals. Shropshires, Oxfords, Southdowns, Cotswolds, Lincolns, Leicesters and Dorsets share in the annual triumph that may well be envied by the breeders of any country against such odds in territory and capital.

A carefully calculated estimate of the number of pure-bred sheep in the province places the number at 19,545 head, divided as follows: Southdown, 600; Oxford, 4,000; Shropshire, 6,000; Dorset, 350; Cotswold, 2,000; Leicester, 6,000; Lincoln, 4,000; Hampshire, 120, and Suffolk, 75 head.

The United States is the chief market for Ontario sheep. For half a century the mutton raisers of the Republic have looked to Ontario for rams to improve their flocks. The free admission of pure-bred animals recorded in recognized United States flock books has maintained a constant flow of seed stock from the flocks of the Ontario breeder. Indeed it is not improbable that the home commercial flocks have suffered from this cause. The prominent breeders, with their eyes constantly towards the south and west, have neglected to develop a home market for rams, with the result that large numbers of flocks in the back country are still using grade sires. It is desirable in the interest of both classes of sheep men that the home market for pure-bred males be exploited and fostered.

Replies to inquiries sent out to extensive sheep breeders indicate that a very large proportion of each succeeding crop of pure-bred males and females go to the United States. The numbers exported, it is claimed, range from 60 to 90 per cent, while one extensive breeder reports the sales of fifty across the line for one at home. Shropshires and the long-woolled breeds go principally to the western states, Southdowns to Kentucky and other central states, while the demand for Dorsets is chiefly from the eastern states of the Union. Many Oxford breeders claim an excellent demand from owners of the grade flocks in Canada.

COMMERCIAL MUTTON FLOCKS.

The mutton industry of the province, which for a number of years showed signs of decline, has recently taken on new life on account of the improved prices of mutton and wool. In a number of counties farmers are exhibiting a strong inclination to return to sheep keeping. On July 1, 1897, the total number of sheep, including young

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lambs, in the province was 1,690,351 head, of which 732,872 were that year sold or slaughtered. On the same date, 1906, the total number was 1,304,806, of which only 574,416 head were disposed of. These figures indicate that owners of flocks are showing a determination to increase their sheep stock, even though better prices could be obtained than heretofore. The output of 574,416 head in 1906 brought $58,258 more money than the 732,416 brought in 1897. It must be remembered, however, that these figures have reference to pure-bred sheep disposed of for breeding purposes as well as grade stock sold for slaughter. The values of sheep and lambs for slaughter on the Toronto market for 1897 and the following years up to July, 1907, are here given:—

Date.	Exporters.		Butchers' Stock and Rams.		Lambs.	
	High.	Low.	High.	Low.	High.	Low.
	Per Cwt.	Per Cwt.	Per Cwt.	Per Cwt.	Each.	Each.
1897—						
July	$ 3.50	$ 3.25	$ 3.25	$ 2.50	$ 4.50	$ 4.50
November	3.20	3.00	2,75	2.25	*4.00	*3.80
1898—						
July	4.00	.....	3.25	2.75	4.75	4.00
November	3.25	3.00	2.50	2.00	3.50	2.75
1899						
July	3,90	3,75	3.00	2.75	4.25	3.00
November	3.25	3.00	2.50	2.00	*3.75	*3.50
1900—						
July	4.25	3,75	3,50	3.25	4.25	2.50
November	3.44	3.25	3.00	2.75	3.50	2.50
1901—						
July	3.60	3.50	3.00	3.50	4.00	2.50
November	3.15	3.00	2.50	2.00	3.00	2.50
1902—						
July	4.00	3.50	3.00	2.75	4.00	2.50
November	3.40	3.25	2.75	2.50	*3.50	*3.00
1903—						
July	3.90	2.75	3.50	2.50	4.50	3.50
November	3.50	3.40	2.75	2.50	4.00	3.50
1904—						
July	4.15	3.85	3.25	3.00	4.50	3.50
November	3.50	2.50	3.50	2.00	4.50	4.00
1905—						
July	3.90	3.00	3.50	2.50	5.25	3.50
November	4.25	4.00	3.50	3.00	6.10	5.50
1906—						
July	4.50	4.25	4.00	3.50	6.25	4.00
November	4.65	4.25	3.75	3.50	*5.65	*5.00
1907—						
July	5.25	5.00	4.50	3.50	8.00	6.00
November	4.40	4.00	3.80	3.00	*5.75	4.25
1908—						
July	4.25	3.50	3.25	3.00	*8.50	7.25

* These prices are per cwt.

During the same decade wool prices showed a similar improvement. Quoting washed wool at Toronto, the prices per pound year by year from 1898 to 1907 were in cents as follows: 16, 14, 13, 16, 17, 22, 26, 24 and 16. Unwashed wool showed a less wide variations as follows: 12, 9, 10½, 9, 7, 9, 13, 15, 18, 14 and 10 cents per pound as the highest valuation during the years.

On the whole the lambs which come to Toronto market are of very desirable quality in spite of the fact that the best are marketed at Buffalo. The trade with this and other eastern United States markets has for many years been very large. In the year ending April 1, 1907, the export of lambs from Ontario to the United States amounted to about 125,000 head. During the same period about 33,000 head went from Ontario to the British market.

The tendency is toward a greatly increased home demand for mutton and lamb of high quality. Heavy sheep are not wanted by the domestic trade, but these can always be sold at profitable prices for export to Great Britain. Extensive dealers claim that the home consumption of lamb has trebled in seven years, and would still further advance if freshly killed stock were obtainable at all seasons. According to

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the present system the great bulk of Ontario lambs is disposed of during the three fall months. Most of the best of these go at once to the American market, while most of the remainder are slaughtered to go into immediate consumption, or be frozen and stored for the winter trade. Needless to point out, this frozen mutton is much inferior to freshly killed stock, provided, of course, the latter is allowed to mature on the hooks in a chilled state before consumption.

A very small percentage of the ewe and wether lambs marketed in the autumn are returned to the country to be fed for the winter and spring trade. These, with the lambs held back by their growers for fattening, invariably command an excellent price from February onward. They are especially desirable to United States buyers for the reason that the wool they carry goes over duty free, saving an amount in many cases equal to the duty paid on the lambs. An excellent opportunity is afforded Ontario mutton raisers to increase their revenue by wethering all their ram lambs, fitting them properly and disposing of them at intervals throughout the season. If this were done the heavy autumn run, amounting almost to a glut in some seasons, would be avoided, the consumption of mutton would increase and a much higher average price for the lambs would prevail throughout the year.

NEED OF A REVIVAL.

The sheep industry in Ontario stands in need of a revival campaign similar to that accorded the dairy and the swine raising industries during the past two decades. While these latter branches of agriculture have been pressing forward, both in the direction of development and improvement, the sheep industry has been almost at a standstill. Perhaps the greatest lack at the present time is a knowledge on the part of the average farmer of proper sheep management.

If this industry were taken as seriously as the raising of hogs for the bacon trade, and the improvement of dairy herds for the production of milk and its products, it would not be long before farmers were as familiar with the conditions necessary to successful sheep raising as they are at present conversant with the proper management of hogs and cows.

With this knowledge and a proper appreciation of the sheep as a profitable farm animal, viewed not only from the standpoint of the economical production of mutton and wool, but also from their ability to enrich and clean farms, this industry would soon take its place among the others, and instead of going back, as it has for many years, would merit the designation ' Golden Hoof,' as it has in England, where the sheep has become one of the chief sources of agricultural revenue.

Manitoba.

Sheep were introduced into Manitoba as early as 1833. In that year Governor Simpson, of the Hudson Bay Co., with the object of benefiting the little band of settlers that comprised the Selkirk colony, organized a joint stock company and sent agents south into the States to buy sheep. These agents went first to Missouri and then to Kentucky, where they purchased 1,475 sheep at about $1.50 each, and started to drive them back to the colony on the banks of the Red river of the north. Through bad management most of the sheep died on the journey, only 251 arriving at their destination. Subsequently the shareholders in the company quarrelled and the governor took over what was left of the flock. These when sold by auction, brought as high as $2 each, a lot of money in those days. Somewhere about 1840 the Hudson Bay Company is said to have brought out from England some pure-bred rams for the improvement of the sheep colony. (This information is taken from Gunn's History of Manitoba.)

Up to about 1880 many of the settlers along the Red and Assiniboine rivers, in the vicinity of Winnipeg, maintained small flocks of sheep. The wool was worked into yarn for home consumption. Blankets and home-spun cloth were manufactured to a small extent by the use of hand looms. With the rapid increase of settlement

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after the above date, these small flocks were disposed of. Since that time sheep have been introduced into practically every district in the province, nearly all the well known breeds have been tried. No disease other than goitre has caused any particular trouble. There has always been a good demand in the towns and cities for mutton and lamb, and yet it is doubtful if there are more sheep in the province to-day than there were twenty years ago.

The question that most naturally ariss in one's mind is—why is it that sheep raising does not become a more popular branch of farming? And the answer that will come most readily from nine-tenths of those who have had experience is—On account of the prairie wolves and the expense of proper fencing.

Unless the industry is taken up on a sufficiently large scale, say a flock of 500 or over, to warrant the keeping of a herder with the sheep at all times, special fencing must be provided. Almost any of the woven wire fences now on the market will answer, a fence say 36 inches high with a strand or two of barb wire strung above it, answers well, but the erection of such fencing requires a considerable outlay. Small flocks of 25 or 50 require almost as great an expenditure of time and trouble as flocks of several hundred, and it is mostly small flocks with which first trials have been made, naturally the results have not been encouraging. The enthusiast starts in with a small flock of his favourite breed, but after a year or two, finding little demand for his surplus breeding stock, concludes that the returns in wool and mutton do not pay for the investment and trouble in keeping pure-breds, and he consequently drops out. Others seeing these apparent failures hesitate before making a trial themselves.

Here and there grade flocks of fair size have been successfully maintained for a number of years until the coyotes became educated to a taste for mutton, and then so insistent do their attentions become that in sheer self defence the whole flock has to be disposed of. The prairie wolf is a sneak and a coward. Until educated to kill, or starved to it, he won't tackle anything so large as a sheep, but, like the dog, once he has tasted the warm blood of a sheep or lamb, the habit can never be broken. Like the sheep-killing dog, he will kill for the love of it even after his hunger is appeased. It is claimed by some that the wolves are not so troublesome in bush or scrub districts as on the open prairies. One breeder on a bush farm reports that with a flock of from 25 to 100 he has lost only two sheep by wolves in thirteen years. A system of giving bounties for wolf pelts has been tried and is still in vogue in the province; $2 each being allowed for prairie wolves and $1 for pups. The total paid out does not vary very much from year to year, but instead of diminishing, rather increases, so that there is little permanent benefit derived from the bounty. The amount, it is claimed, is not sufficient to induce the serious hunting of the coyote, but with the large areas of wild lands within the province which are breeding grounds for this pest there appears little hope of being able to exterminate the wolf. Some naturalists contend that if the wolves were killed out that the country would soon be overrun with gophers, mice and other vermin. The only remedy would appear to be wolf-proof fencing, as above referred to.

GREAT NEED FOR SHEEP.

The method of farming usually followed in this province, of cultivating the largest possible areas with the least possible amount of labour, the wide open fields, the reckless and wasteful way of threshing, together with the natural fertility of the soil, has tended to overspread whole districts with weeds of the most noxious character. To put these lands back into condition to grow profitable crops will require care and skill. The acreage per man must be reduced, and more systematic methods of cultivation adopted. In this connection sheep could most economically be utilized to help clean such land, as they will eat almost every variety of weed, and while they are eating the weeds they firm the soil, putting it in ideal condition for cropping. They could also be profitably employed in converting into mutton the thousands of bushels of weed seeds and screenings upon which dockage and freight is now lost to the farmer. Weed seeds that pass through the grinders of a sheep will not germinate.

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In connection with the disposal of screenings quite an industry has sprung up in feeding range sheep at elevator centres, such as Moosejaw, Brandon and Port Arthur. At the latter point hundreds of tons of screenings accumulate, and some thousands of sheep are fed during the winter. These sheep are obtained from the western ranges and are chiefly Merino grades, with one or more mutton crosses; they are marketed after about 100 days feeding on an almost exclusive diet of screenings, and are nearly all disposed of in Winnipeg and Toronto.

The Winnipeg market is supplied principally from the western ranges, as the sheep raised in the province do not supply the local demands. Frozen mutton is also brought to Winnipeg from the maritime provinces. For the first six months of 1907 upwards of 8,000 sheep were received at the Winnipeg stock yards, the price ranging about $7.25 per head.

From what has been said it is quite evident that there is a profitable opening for sheep raising in Manitoba. A different system of farming must be adopted, or weeds and poor tillage will ruin whole areas. In the evolution that will take place a crop rotation, including grass and clover, is essential. With a crop rotation, fencing must be resorted to; barb wire is not the fence for such purpose, whatever kind of stock be kept; the standard woven fences are rather expensive; something cheaper and equally effective must surely be found. With suitable fencing at reasonable cost, sheep will be found one of the best assistants in cleaning the land. The capital required is not great, they do not require expensive buildings, they call for little labour, they are in large measure free from disease, and their products command a ready and profitable market.

Of the many breeds that have been kept here, the Shropshire is probably held in most general favour, owing to the closeness of its fleece, good mutton qualities, and general adaptability. It is, however, worthy of note that for several years past the Leicesters have been making the most attractive, if not the most numerous, displays at the larger fairs of the province.

Reports from sheep raisers within the province show clearly that the demand both for killing stock and pure-bred breeding animals has improved very much during the past few years.

From 1896 to 1898 butcher's lambs brought about 3½ cents per pound, and sheep a trifle less. In 1899 4 cents was paid at the shipping points for lambs and 3½ cents for ewes. The following year the price had increased another half cent, and since 1901 from 4½ to 5 cents per pound has been the prevailing price for both sheep and lambs of good killing quality.

Reporting upon sales of pure-bred stock, breeders state that from 1895 to 1900 rams lambs brought from $5 to $10 per head, and good shearlings from $15 to $25 each. Good ewes were worth from $10 to $15 each. About 1903 prices began to improve that year, reaching $16 for lambs and $20 to $40 for shearlings of either sex. These values have been maintained and in a few cases surpassed, while the demand in 1907 was so firm that the supply was not enough to meet the requirements. The above quotations are for Leicesters. A few breeders of Shropshires and Oxfords report slightly higher prices with a keen local demand for good stock.

Saskatchewan.

Sheep raising in Saskatchewan is a branch of farming that has made very little headway during the last fifteen years, a number that kept small flocks of sheep in the early days disposed of them after a trial. The sheep did all right, but a good many things combined was the reason of their being done away with. Some of the causes were the great losses from wolves or coyotes; another cause was the high price of fencing, people couldn't afford woven fences in the early days. Mutton and wool was also low in price, and wheat was high and paying well.

Within four or five years a great many farmers have desired to go in for sheep, from the inquiry for breeding ewes, quite a few have actually done so.

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Fig. 64.—A Mutton Flock in Manitoba.

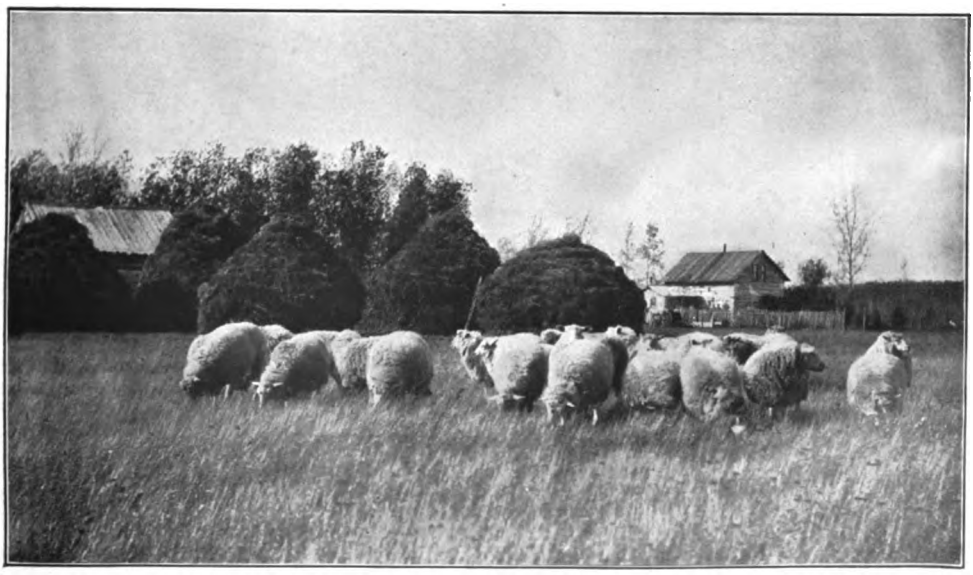

Fig. 65.—The presence of sheep helps the yield of wheat.

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Fig. 66.—A Range band in Saskatchewan.

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In Saskatchewan the industry is carried on under much the same methods as in Alberta.

There are very few pure-bred flocks of sheep in Saskatchewan, not more than eight or ten. Leicester, Cotswold, Shropshire and Oxford are the breeds represented. The flocks are yet very small and not increasing rapidly. Good ram lambs bring from $15 to $25, as flocks are only being formed, no females are yet sold. Lambs in pure-bred flocks mostly come in March, they need to be housed all spring, and the mother liberally fed, and have plenty of exercise. Any pure-bred sheep intended for exhibition during the summer or fall should be shorn bare when housed in the spring. Quite a few sheep are exhibited in the west with the whole or the greater part of their old wool on. This is bad practice and should not be tolerated by fair boards.

The number of farmers in the province keeping ordinary grade sheep is very small indeed, taking the size of the province into consideration. Flocks run all the way from a dozen or twenty to six or seven hundred. So much depends on location, environment, etc., for numbers kept and the method of grazing them during the four months the crop is on the ground. Several farmers sometimes join their flocks, employ a lad or man to herd the bunch on prairie some distance from home. The herder has a temporary shack put up or a caboose to sleep in. A large corral is made to shut up the sheep at night.

Some farmers have a fenced pasture at home for keeping their flock during the summer. Where a farmer who has a large flock of several hundreds can get an open run and employ a lad or man to herd them during the day, bring them home to a fenced pasture or corral at night, he gets along well; but few flocks are large enough to work that way. On a cropping farm it is profitable to grow some rape on summer fallow. The land can be ploughed whenever seeding is finished and sown with four pounds of rape seed and one peck of grain of some sort; an ordinary disc or shoe drill will sow it. The rape will be ready for pasturing about the first week of August, when pasture gets dry. Great care needs to be taken not to put sheep on it when wet, as sheep are very liable to bloat.

After the grain crop is thrashed, sheep, as a rule, run at large. There is always excellent feed on the stubbles and summer fallows. If wolves disturb them they require to be watched, and should always be brought home at night.

WINTER FEED.

Oat straw, oat sheaves, with hay if it can be spared, is the winter feed; some give a feed of grain in the spring. They should always be kept in good thriving condition and not too warmly housed.

Lambing starts in some flocks in the beginning of March; it is a very great mistake having lambs some so early. When the weather is severe and spring late, it is simply impossible to keep newly dropped lambs alive. There should not be a lamb in a farmer's flock come before the 25th of April. A lamb born in the first half of May will be worth a great deal more in the end of October than one coming in the beginning of March. With ewes in fairly good condition, weather moderate, feed plentiful and with experienced management, there will usually be a high per cent of lambs saved. If the flock is large twins are not profitable. Lambs should be castrated and docked at from three to four weeks old. There is quite a difference of opinion in regard to the method of wethering. Cutting the end of the scrotum with a sharp knife and drawing the testicles with the teeth is the almost universal way of performing the operation. If the operator is skilful, the fold or house clean, and the lambs not over heated there will be little or no loss. A great deal depends on the condition of the sheep and the weather when shearing should start. About the 10th of June is a very good time. It does'nt pay to wash sheep in Saskatchewan before shearing. Several farmers have shearing machines, but hand shears are in more general use, but not many can handle them well.

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RANCHING.

As the cattle and sheep men had differences in regard to paying leases, parliament some years ago set apart certain districts where leases for grazing sheep alone could be got. There were 17 townships along the international boundary line southeast of the Wood mountains, 11 townships southwest of Swift Current, and between 60 and 70 townships mostly north of the Canadian Pacific Railway main line and Maple creek, set apart for sheep grazing. Quite an area in those districts can yet be leased for sheep.

Ranching flocks vary greatly in size from one or two thousand up to four thousand in a ranch. One sheep man can look after that number in summer. They are usually taken a good many miles away from winter quarters or the home ranch. The herder has a horse, a couple of dogs and a caboose to sleep in. Provisions are taken to him about every three weeks. When the ground gets dirty he moves his sheep to a new location. The sheep are kept out till the snow comes. All the hay and feed of any kind that can be got are put up at the home buildings for storms and deep snow in winter. Some seasons very little hay or feed is needed, but a rancher should always be prepared for any contingency.

Ewes on the ranches should not start lambing before the first of May, except in a very late spring there is always quite a bite of fresh grass by that time. Newly dropped lambs, in fact the whole flock, require a lot of care and attention during lambing. Shearing on the ranches is mostly done by contract at from 7 to 8 cents per head. Most of the draft sheep from the ranches are shipped either east or west for further feeding. The breed of sheep on the ranches are mostly Merino grades—the foundation flocks came from Montana. Shropshire, Oxford, Leicester and Lincoln rams are used. There have not been many sheep fattened during the winter in Saskatchewan. It has been successfully tried at Moosejaw, where several thousand were fattened on wheat screenings. Now, when the production of wheat is increasing so rapidly and so much good feed in small wheat and screenings is going to waste, sheep feeding in winter is a branch of the industry that might be very profitably engaged in.

Alberta.

In the province of Alberta sheep raising is carried on under two widely different methods. In the northern portion of the province, where general agriculture is pursued, sheep raising is carried on in much the same manner as in Ontario and other eastern provinces. A small portion of the farmers have small flocks, which are kept in inclosed pastures during the summer season and are fed in more or less inclosed sheds during the winter. In Southern Alberta sheep raising is carried on almost entirely under the ranching system.

South of Calgary there are probably not more than twenty small bands of sheep, and of these only three or four are pure-bred. Farther north, between Calgary and Edmonton, there are a few flocks of pure-bred sheep. Shropshires are the most popular breed, farmers like the 'black faces.' The demand is about equal to the supply. In 1906 and 1907 Shropshire were shipped to Montana at prices running from $12 to $16 for lambs and $14 to $25 for shearling rams. Ewes were about the same price, though most farmers are grading up with pure-bred males, and the demand for ewe stock is easily met by the supply. There are not more than one or two flocks of Rambouillets in the province, and only a few Lincolns and Cotswolds. Were it not for the coyotes, raising pure-bred sheep would be very profitable, but the fences must be good or that gray shadow will pick off a $20 lamb as quickly as a $3 one.

FARM FLOCKS.

The grade flocks have principally a dash of Merino in the ewes. Grade Lincoln and Shropshire bucks are bred from, but the wideawake farmers are finding out it is a better investment to buy pure-bred male stock. The lamb crop from these small

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bands is usually heavy. One Lethbridge farmer raised 130 lambs from 100 ewes. The fence problem and the coyotes are the main drawbacks to keeping sheep in small bands.

There is a strong tendency towards increased sheep breeding on the farms of Alberta. A number of farmers from the Lloydminster district, early in October, 1907, were out to buy breeding stock. One of them, Mr. Burton, an experienced Australian shepherd, wanted to get 50 or 100 yearling ewes. He put up plenty of hay for winter feed and runs his sheep in open sheds during the cold weather. For summer grazing he says he thinks the rolling country there would be ideal. For the market he says that they could get any reasonable price for lamb and mutton at the small towns. It is almost impossible to get any now. If farmers in any neighbourhood would only combine and buy from 500 to 1,000, keep them separate during the winter and during lambing, then throw them into one band to be herded during the summer, they would surely find it exceedingly profitable. Undoubtedly the mutton breeds will be much more profitable for the north. The Merino does not stand the cold well enough. The needs there are practically those of Ontario.

Prices to-day are high, and the quantity of breeding stock offering very small. If prices weaken a little south of the line it may be possible in the near future to buy a little cheaper, but farmers can buy in Alberta yearling ewes for less than $6 each. If they could buy in carload lots the freight would be about 50 cents per head, otherwise $1. With the establishment of woollen mills like those of Lethbridge and Edmonton the local market will be a more certain thing and a coarser grade will find a more ready market sale.

To sum up—Farmers' flocks have and are proving very profitable. Feed and shelter are needed north, and some will pay even in the south. Very soon farmers will have to fence, with chicken netting or some heavier woven wire. The local demand will take all the mutton and wool at good prices. In buying, two or more farmers should combine and buy in carload lots to save freight. Only young ewes should be bought, the better returns and lessened risk amply justify this course. Where possible all sheep should be put on stubble so as to go into winter in good heart.

RANCHING.

In the ranching country the soil is rather dry and the rainfall light. The natural herbage upon the prairie and undulating river banks being short and fine is much relished by the sheep and suitable for the production of mutton of fine flavour.

The sheep differ widely from those reared in the eastern provinces. The foundation stock which came largely from the adjoining states of the American Union, principally Montana, are chiefly of Merino breeding. The stock from these naturally yield small carcasses and heavy fleeces. In recent years Down and Long-wool sires are being introduced with a view to increasing the weight of carcass. The range flocks vary in size from two thousand to twenty thousand head. They are grazed under the care of herders the year round in bands of from two thousand to four thousand head. In winter they are expected to rustle a living, which they can usually secure with a little assistance on the part of the shepherd. If the snow becomes deep or crusted a snow plough is used to uncover the grass, or a small allowance of hay and oats may be fed until the mild chinook melts the snow from the prairie. In earlier years no feed was put up for the sheep in winter, but experience taught that if a month or two of cold weather with deep snow occurred, weak members of the flock, including old ewes and lambs, died in large numbers. A winter's loss of two or three per cent was expected, but occasionally it has reached twenty-five per cent when no provision had been made to feed during a cold spell.

In the earlier years lambs were dropped on the prairie during April and May, frequently without shelter. Usually under these conditions from 70 to 80 per cent of the lamb crop was saved, but in severe seasons the increase did not exceed from 40 to 50 per cent.

Taught by experience, ranchmen of the present day put up a greater or less supply

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of feed, and nearly all have sheds for the protection of the flocks when occasion requires. It is the rule with the more successful ones to put up from 25 to 40 tons of hay for each thousand head of sheep in addition to a good supply of oats, which are useful for improving the conditions of their ewes or lambs, before the winter sets in.

THE LAMBING SEASON.

The lambing season on the range is a busy one for the shepherd. He may have charge of from 500 to 2,000 head of ewes. At night the ewes are inclosed in a shed or corral and a night man gathers and cares for all the lambs coming during the night. As soon as a ewe has dropped her lamb and has had time to 'mother' it they are both placed in a compartment of the lamb wagon. When the wagon is full it is driven to the shed and the ewes and lambs are put into small pens. Here another man in charge sees that the lambs suck, takes care of the weak ones and provides suitable food and water for the ewes. A ewe that refuses her lamb is placed in a pen so narrow that she cannot turn or get away from her hungry offspring. In this position she usually takes up with her lambs within a few hours. The day following this lot of ewes is turned out in small bunches, where they remain until they become accustomed to finding their lambs in a crowd. As the lambs get older the ewes are gathered into larger bunches, until at six weeks old they may all be thrown into one flock. In the meantime the lambs have been docked and castrated—operations sadly neglected by many mutton raisers in other parts of Canada.

The wool side of the range sheep industry is a very important one. In no part of Canada outside of the range area can fine wool be attained in large quantities, and it is to the range country that many of the eastern tweed manufacturers look for their supply of fine wool. Some years ago the clip was finer than now, owing to the great predominance of Merino blood. More recently Down and Long-woolled sires are being used for the purpose of improving the carcass. This, naturally, is bringing about a change in the character of the fleece, which is becoming coarser with each succeeding mutton cross.

SHEARING.

The shearing of Alberta flocks is done by contract, the price paid being about 7½ cents per head. A gang of shearers consists of from a dozen to twenty men, who shear from 50 to 100 sheep each per day. This is done by hand shears, but machine shearing is being introduced upon the large ranches.

The sheep shear from 6 to 9 pounds per head. Each fleece is tied separately and the fleeces are tramped into large sacks about fifty to a sack. A number of the more careless operators tie the fleeces with cord, but those who have regard to the requirements of the trade use the twisted wool band to bind the fleece. The use of binder twine in tying up wool causes serious loss in the woollen mill, as the strands become incorporated with the wool, getting into the fabric, reducing its value several cents per yard.

Prices for range wool have gradually increased during recent years. In 1903 the clip brought from 6 to 10 cents. In 1906 as high as 17½ cents was paid, while the clip of 1907 sold for an average price of 16 cents per pound.

Mutton is also showing a fine advance in value. In 1904 $3.15 per cwt, with a 5 per cent reduction for shrinkage, was paid. In 1906 $5 per cwt. was not an uncommon price for moderately good stock, while in 1907 $7.50 live weight was reached for well-fed butchers' sheep. Lambs in 1904 sold at $1.75 to $2 per head; while three years later the price had reached $3 to $3.25 per head, and comparatively few ewes were for sale early in the season at this figure, since the demand for ewe stock for the breeding flocks was strong and it was felt that the males, most of which are wethered, would grow into more money by autumn. The improving demand for mutton has induced the ranch men to let go old ewes, weakly lambs and yearling wethers, thus removing the inferior specimens, thereby placing the flocks in a much stronger

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position for the future. It has also inspired that confidence in the industry that begets safer methods, better handling and increased prosperity.

THE OUTLOOK.

Without doubt a bright future awaits the sheep industry in Alberta. There is bound to be a growing demand for the products of the flock. As years pass the ranges, with their wholesale and rather rough methods of handling, will give way to more numerous but smaller flocks. This will make possible and profitable better attention to housing and feeding in winter. With the production of tame hay, including alfalfa, and large yields of coarse grains upon the farms, the sheep will be fed and sent to market in a finished condition. The question of fencing, that has stood in the way of sheep raising, will of necessity receive that attention that mixed agriculture on smaller farms requires. Many who do not fence for their flocks will combine with their neighbours in having several flocks herded together during the summer where suitable range and water can be secured. The tendency will be to produce mutton first and wool as a secondary consideration. Early maturing lambs will be raised and sheep farming will become a valuable staple industry of growing importance from year to year.

DIFFICULTIES.

It must not be overlooked that the sheep raisers of Alberta experience difficulties. While the general health of the flock is good, the sheep in Alberta are subject to the several ailments that affect this class of stock in other districts. Scab has existed in one or two limited areas, but careful attention to dipping with suitable insecticides quickly eradicates this malady.

Tapeworm, too, is not unknown in the sheep of Alberta. In some seasons considerable losses in lambs and ewes were experienced early in the season, but after green grass had arrived the losses have almost entirely ceased. With the better care in feeding and shelter that has been given in recent years trouble from tapeworm is gradually disappearing.

As in all new countries where the native herbage is the chief source of food supply, troubles from poisonous plants are sure to occur. The admirable disposition of sheep to consume weed growth increases the risk from this source. In a small number of reported cases sheep have been lost by eating young plants of Death Camas. In one case a rancher is reported to have lost on one occasion 150 of a flock of 2,000 head from this cause. As cultivated pastures and fodders come into more general use losses from poisoning will become less and less frequent.

Abortion has worked serious havoc in certain flocks and districts, although it is quite unknown in many sheep-raising sections. The losses on the small number of affected ranches ran from ·01 to some 30 per cent, which latter was reported by one firm, and in no case has the same rancher experienced loss in two succeeding years.

Abortions usually occur in March or April, but are not confined to that period. Ergotted grasses are blamed for a small proportion of the losses, while rough herding, accident and poor condition are also considered responsible for losses. Pasturing on land closely cropped or mowed the previous year is recommended as a preventive against abortion from eating grasses affected with ergot.

The coyote, or prairie wolf, is looked upon as an enemy of sheep. This animal to infestation with lice and ticks. Of these the louse is most to be dreaded, both on by hunger, full grown sheep are attacked and worried. It seldom occurs that a raid is made upon a band of sheep, a victim usually being a single animal that from lameness or weakness has become separated from the others. The natural antipathy of man for an animal of the wolf species, together with the bounty of $10 per head for timber wolves and $1 each for coyotes and pups, is having a fine effect in keeping down the wolf and coyote nuisance.

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British Columbia.

It would be impossible to properly outline the early history of the sheep industry in British Columbia without first giving a short account of its early development in the Pacific Northwest, north of the Columbia river.

In the early part of the nineteenth century the Hudson's Bay Company, and later the Puget Sound Agricultural Company, the latter largely composed of Hudson's Bay employees, established farms at Fort Nisqually, on the plains of what is now Washington State, a few miles distant from the present city of Tacoma. At that time this territory was under the control of the Hudson's Bay Company, and the international boundary between the United States and the British possessions had not been finally decided on this part of the continent. Sheep driven from California were purchased by the agents of the companies, until in the early forties the flocks numbered some thousands. The quality of these sheep was improved by the importation from time to time of well-bred rams from Great Britain via Cape Horn on sailing ships, which brought for the companies their annual mail and fresh stocks of goods. When the boundary line was finally agreed on these flocks were disposed of, a large number of sheep going to Oregon, where they played an important part in founding the great sheep industry of that state, and from there were scattered about the neighbouring states. It will thus be seen that the early British settlers were among the first promoters of improved sheep husbandry in the Pacific Northwest.

On the establishment of a Hudson's Bay post on the present site of Victoria, B.C., at the southern end of Vancouver Island, in 1843, farms were located by the two above companies and sheep brought from Fort Nisqually to stock them. These sheep were principally of the Merino, Southdown and Leicester blood and were the foundation of the sheep-breeding industry in this province. They did very well on these farms situated near and within the present boundaries of the city of Victoria, and in 1849 numbered several hundred head. They suffered somewhat from the depredations of panthers, wolves and bears, and occasionally from vagrant dogs. The sheep were herded by armed Indian shepherds in the day time and coralled at night. Indians from early times showed their appreciation of a change of diet from fish and venison by occasionally raiding flocks. This love of mutton made a little British Columbia history in the early fifties, when a warlike band of Indians swooped down from their village a short distance up the coast to Victoria, and raided a flock, murdered the shepherd, and carried off a number of sheep. Their village was visited by a British gunboat from Victoria some time afterwards and the murderers captured and hung to a tree nearby. This first experience of British justice made a deep impression on the natives, which was shown by their carving and painting a large figure of a British marine standing at attention. This adorned a prominent spot in the village for years afterwards.

IMPORTATIONS BY PRIVATE INDIVIDUALS.

Some time after sheep were first brought to Victoria by the Hudson Bay Company a number of small private flocks were established near Victoria by employees. The Hudson's Bay and Puget Sound companies imported improved rams from Great Britain, and thus raised the quality of the flocks. During this time some sheep were also imported from the Hawaiian Islands. The first importations of pure-bred sheep by private individuals was in the early seventies, the first being Leicesters from Oregon, soon followed by Southdowns from Ontario.

About this time a number of flocks were established on the islands in the Gulf of Georgia, and some trade in sheep begun with the American possessions in that region. For some years after the settlement of the San Juan Islands' dispute by arbitration, when that island was ceded to the United States, considerable smuggling of sheep and lambs was carried on among these islands. The extraordinary large numbers of lambs marketed in Victoria from small flocks of ewes in some of the Canadian islands, was a great surprise to many who were not familiar with the conditions, and seemed to speak volumes for the prolific (?) Canadian ewes.

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Since that time the quality of the sheep has been greatly improved, and several first quality flocks have been established principally on the coast, and scattered over the lower mainland and upper country a few farm flocks are to be found. Range flocks are not nearly as numerous as might be expected, due largely, no doubt, to the fact that sheep are not allowed to pasture on public ranges in cattle districts. On many of the islands where sheep do particularly well a law passed in 1888 limits the number to be grazed on Crown lands. This, coupled with the growth of the fruit and dairying industries, has reduced the number of sheep kept. The high prices for farm produce, such as hay and grain, and the rapid growth of dairying along the rich bottom lands of the Fraser valley, have kept the sheep industry from developing as it should, though of late both breeding and feeding are being followed more than formerly. The rich pastures of the coast and on Vancouver Island makes this business always a safe and profitable one.

The following figures will show what can be accomplished in the way of sheep raising near Victoria. Mr. C. B. Jones has an average Victoria district farm partially cleared. Mr. Jones has charged nothing for pasturage, as these sheep grazed in slashed, burnt-off land, and he estimated that they paid for their pasturage by keeping down the second growth. He says this land was of very little value in its present condition except as sheep pasture.

STATEMENT showing profit derived from thirty ewes, 1905.

Revenue.	$ cts.	Disbursements.	$ cts.
To 42 lambs, at $4.00	168 00	By feed in winter	30 00
150 lbs. wool, at 12c	18 00	Interest on investment of $180 at 6 per cent	10 80
		Loss of 2 ewes	12 00
		Net gain on 30 ewes	133 20
	186 00		186 00

STATEMENT showing profit derived from fifty-eight ewes, 1906.

Revenue.	$ cts.	Disbursements.	$ cts.
To 64 lambs to butcher, at $4.25	272 00	By feed during winter	60 00
20 ewe lambs retained, at $5.00	100 00	Chemicals used for dip	3 00
240 lbs. wool, at 15c	36 00	Interest on investment	21 60
1 ram lamb sold	7 50	Loss of 3 ewes	18 00
		Net gain on 58 ewes	312 90
	415 50		415 50

STATEMENT showing profit derived from sixty old ewes and twenty yearlings, 1907.

Revenue.	$ cts.	Disbursements.	$ cts.
To 60 lambs to butcher, at $5.50	330 00	By Feed during winter	75 00
27 lambs retained, at $5.50	148 50	Loss of ewes	30 00
320 lbs. wool, at 13c	41 60	Interest on investment of $460.00, at 6 per cent	27 60
		Net gain	387 50
	520 10		520 10

SUMMARY.

1905. Net gain on 30 ewes, $133.20; or $4.44 per ewe; or 74 per cent.
1906. Net gain on 58 ewes, $312.90; or $5.39 per ewe; or 89 per cent.
1907. Net gain on 60 old ewes and 20 yearlings, $386.50; or $4.85 per ewe.

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IMPORTATION OF MUTTON.

Despite the fact that sheep raising is a paying industry, over sixty thousand head of live sheep are imported annually from the State of Washington and a number from the province of Alberta to help supply the British Columbia trade. Besides these many thousand frozen carcasses are imported from Australia.

The consignments arriving at British Columbia ports are composed of mixed lots consisting of about half wethers and the balance full-monthed ewes. They weigh on being landed at Victoria or Vancouver about 100 pounds each. Freight from the ranges to the docks is about 50 cents per head and the duty is $1.12 per 100 pounds. Thus the local man has an advantage of $1.62 per head in competing with imported stuff.

The price of these sheep on the coast docks ranges from 5 to 7 cents per pound. They sell in the market at from 13 to 16 cents per pound by the carcass. Australian mutton sells at from 11 to 12 cents per pound by the carcass.

THE INDUSTRY UNDER VARYING CONDITIONS.

As the industry is carried on under such different conditions and circumstances, it will be necessary to say something of management on the farms of the islands, the lower mainland, the interior and on the ranches.

On Vancouver Island and the islands of the Gulf of Georgia the keeping of flocks of from twenty-five to four hundred head has always been a profitable business. On account of the rainy winters the medium and short wool breeds have taken precedence over the long wools, although the latter also do very well. The foundation of nearly all the flocks in this region are Down grades, on which are used Shropshire, Southdown, Oxford Down, Leicester and Cotswolds. Owing to the mild winters comparatively little winter feeding or shelter is provided, in the worst winters only a few weeks being necessary. More liberal winter feeding could be done generally with advantage and would give good returns. In the island districts for the production of mutton the flockmasters aim to have the lambs arrive in April and May, when the grass is good. For the lamb market they come during January, February and March. The yield here, as under farm conditions generally, runs from 100 to 150 per cent and upwards. Ram lambs are usually castrated at from three to four weeks old.

Growing lambs for market is one of the most profitable lines of the flockmaster here. The lambs are usually disposed of when weighing dressed from 25 pounds for very early, to 65 pounds for late summer and fall. These lambs bring from $4 to $6 per head, with a brisk demand for anything in good condition.

THE LOWER MAINLAND.

On the lower mainland sheep are very profitably reared in many places, particularly at Chilliwack and at Ladner. In these districts, possessing soil as rich as is to be found anywhere on this continent, and with a mild climate and sufficient rainfall, a luxuriant growth of grass is accessible almost at all times of the year, with the result that for ordinary flocks feeding is seldom necessary. The commercial flocks of these districts are principally of a Down foundation, and on these pure-bred rams are used. One Ladner man disposed of fifty grade Oxford Down ewes at Christmas time that averaged 250 pounds each; they were sold off grass and had never been fed grain in their lives.

Sheep are profitably kept on many farms in the interior in small lots, and where alfalfa can be grown they are produced at minimum cost. It is estimated that good alfalfa pasture will support five sheep per acre during the growing season, provided it is not cropped too close and the animals are changed from one pasture to another, this is in strong contrast to the open range, where it is estimated that from three to four acres are necessary to support one sheep the year round, with extra feed during heavy snow.

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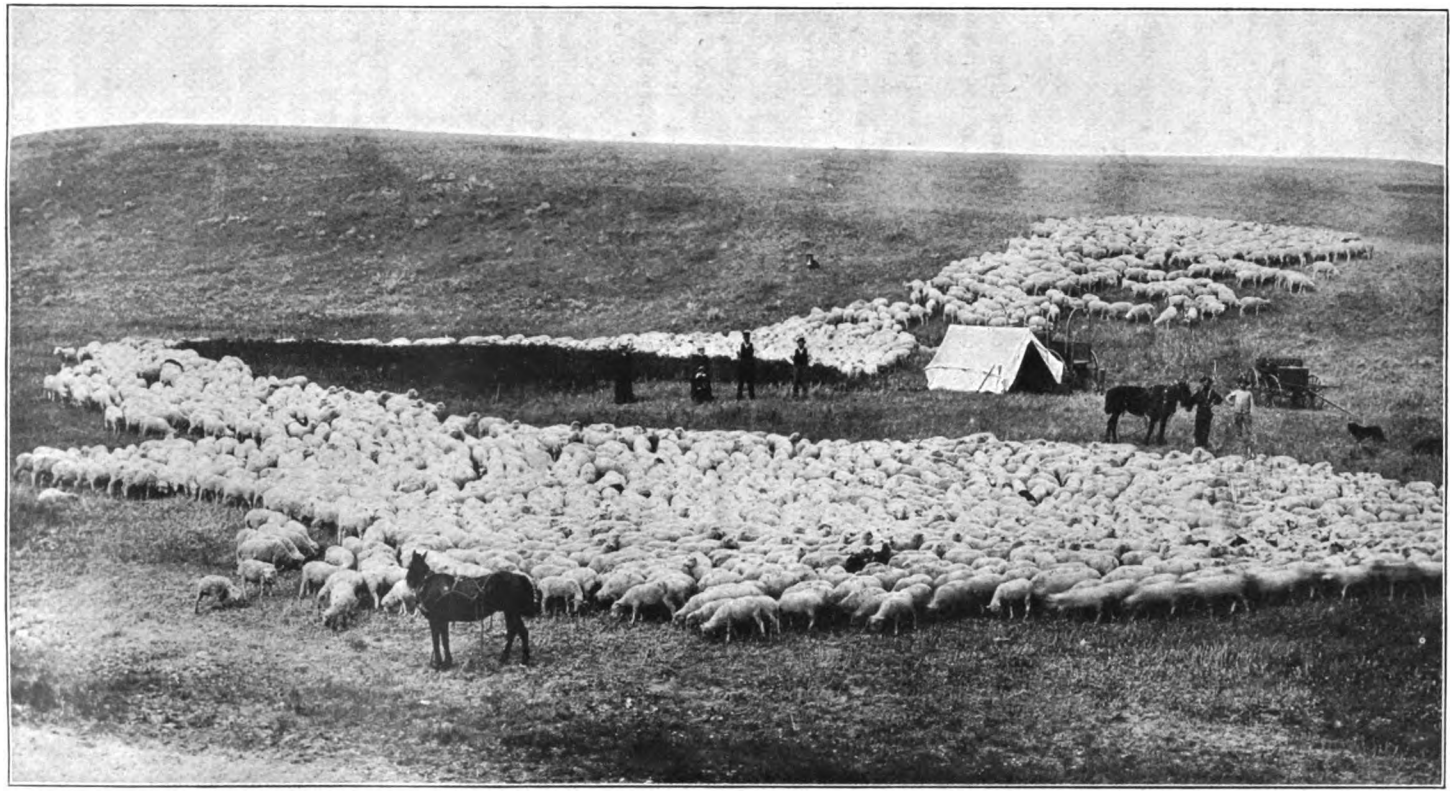

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Fig. 67.—Grazing in the Foothills of Sunny Alberta.

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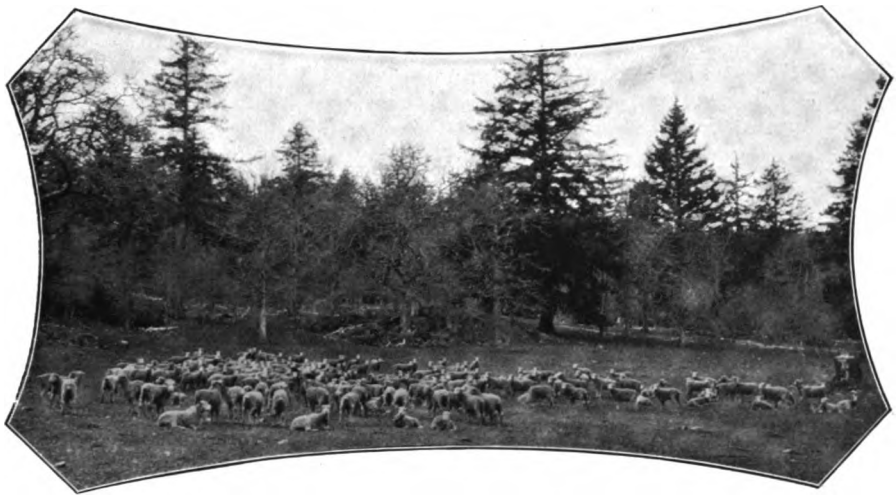

Fig. 68.--Merino Grades in British Columbia.

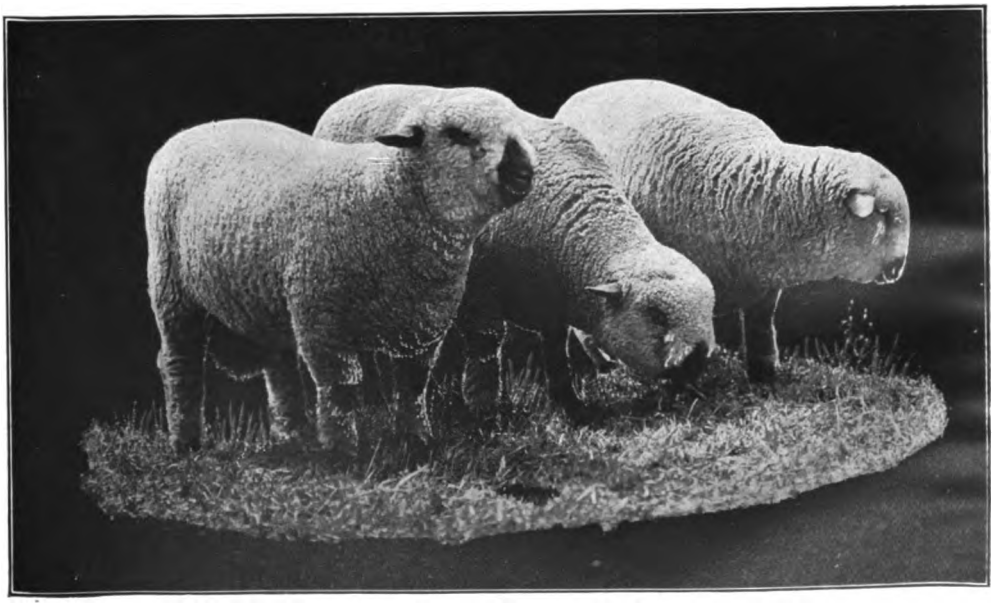

Fig. 69.—Three Lusty Lambs.

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FEEDING FOR MARKET.

Sheep feeding has been carried on to a limited extent at Ladner during the last few years. Mixed lots of thin Washington sheep, principally from the Island of San Juan, are purchased during the late summer and put on the aftergrass of meadows. They cost, in mixed lots, ewes and lambs, at steamboat landing, about $3.70 per head, and picked lambs about a dollar more. They are turned off from Christmas to the end of March, and net the feeder from $1.50 to $2 per head. No feed is given these sheep except hay if the ground is covered with snow. Between two and three thousand head were fed at Ladner during the winter of 1907-8, a great many more could be handled, but the right kind are difficult to secure, owing to the great demand for sheep everywhere.

RANCHING.

To handle sheep in large lots in the interior of the province without fence it will be necessary for the prospective flockmaster to select those parts where cattle ranching is not being carried on to any great extent. In order to secure a large enough range with the necessary meadow for hay cutting it will be necessary to go to the sparsely settled districts as all the older districts have large numbers of cattle grazing in them. No very large flocks of sheep are kept under range conditions. From 1,000 to 1,500 head are the largest bands and these are few in number. The range management differs considerably from that already described. The foundation stock of the range bands are principally Cotswold, Lincoln, Southdown and Shropshire grades, with a small admixture of Merino. Breeding ewes weigh about 130 pounds each. On these are used Oxford, Shropshire and Cotswold bucks at the rate of fifty ewes per buck.

At lambing time, which is about the middle of April, the breeding ewes are kept close to headquarters and those that have lambed are kept by themselves, being removed from the main flock morning and evening as the lambs are dropped. Ewes with twins are placed in a separate bunch for a few days until they become accustomed to their lambs. Twins are marked so that if they lose their mothers there is less difficulty experienced in restoring them. Lambs are castrated at from two to three weeks old with comparatively little loss.

The marketing of mutton sheep takes place from June to December. From 5 to 5½ cents is the price paid at the railway station. Good shepherds are scarce, they are paid about $50 per month. In their herding they are assisted by two or three good dogs, which are valuable in keeping coyotes away and in driving the sheep.

In mild open winters feeding is not absolutely necessary, but better results can be obtained by feeding from two to three pounds of mixed clover and timothy hay per day, with the addition of a few roots and some grain for their breeding stock.

PURE-BRED FLOCKS.

The pure-bred flocks are found principally on Vancouver Island and the island of the Gulf of Georgia, the districts tributary to the Fraser river and in the Okanagan valley, probably fifty flocks in all, and with from five to fifty in a flock. The breeds represented are Cotswold, Leicester, Lincoln, Shropshire, Southdown, Oxford Down, Hampshire, Suffolk, Dorset and Tunis. Prices of pure-bred ram lambs range from about ten to thirty-five dollars; yearlings from fifteen to forty; ewe lambs from ten to twenty-five each. The breeders are supplying the demand at present, but more could be used, if some flock owners could be induced to realize the benefits to be derived from using pure-bred sires.

The breeding of pure-bred sheep has, with few exceptions, fallen into good hands in this province. The breeders improve their flocks by importations of improved animals from the east, south and from Great Britain. Exhibitors usually show their animals properly prepared, and in competition with imported stuff at the fairs here, and the Lewis and Clark Exposition at Portland, Oregon, have shown that they were capable of successfully competing with the best.

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WOOL.

The average wool clip of coast sheep is from 5 to 7 pounds for the small breeds, while small flocks of the heavier breeds will sometimes average 10 pounds. Farther inland it runs from 6 to 10 pounds. On the ranges shearing costs 8 cents per head, and from 6 to 8 pounds of wool of good quality is the average. In the early years of the sheep industry in British Columbia wool brought 30 cents per pound. The general quality of the wool is good, but it is often sent to market in poor condition, containing foreign matter of various kinds, which causes a shrinkage. Sheep skins bring from 30 cents to $1, depending on the quality and length of wool. As the industry develops a woollen factory would improve the conditions of the wool market.

PREDATORY ANIMALS.

In this province the sheep industry suffers in a greater or less degree from dogs and other predatory animals, such as timber wolves, bears and lynx, but the damage done by these animals is comparatively small. Panthers and coyotes are the greatest source of loss. On the smaller islands of the Gulf of Georgia there are no predatory animals. On Vancouver Island panthers give the most trouble. The government has increased the bounty to $15 per head, which should keep them in check. In the interior the bands kept under range conditions have to be corralled at night and herded by day to protect them from the attacks of panthers, wolves and coyotes. Panthers are rare, and wolves but rarely attack a flock, but coyotes, despite the bounty of $2 per head, seem to be almost as plentiful as ever. In some large flocks the loss runs as high as five per cent. So far coyote-proof wire fences have not been used in British Columbia, but have been successfully used in some of the American states.

DISEASES.

Very little dipping is done. No scab or other contagious disease is to be found in the province since the inspection of sheep at the American boundary has been enforced. Dipping for ticks could, however, be done oftener with benefit. On some low lying undrained farms Liver Fluke does considerable damage. In some districts where the rainfall is heavy and sheep are not given shelter we find them affected with snuffles, a catarrhal condition of the nasal membranes. Parasitic Bronchitis, or Hoose, is occasionally encountered.

ASSOCIATIONS.

The organization of the Vancouver Island Flock Masters' Association at Duncan, B.C., for the purpose of stimulating the breeding of improved sheep has done a vast amount of good, and the organization of similar associations in other parts of the province would greatly help the industry. This association was formed in 1892 for the purpose of improving the quality of sheep in the district. They imported pedigreed rams which were rented to members at so much per ewe. They gave an extra bounty for panthers killed in the district, and offered premiums for sheep at fairs with excellent results. This association receives a provincial government grant of $250 per year.

THE OUTLOOK.

The opportunities offered by the sheep industry in many parts of the province are excellent. The market is first class at present, and when we consider that the vast mineral, timber, fisheries and agricultural resources are just beginning to be developed, with available agricultural land small in proportion to the area of the province, the prospects for the future of the sheep industry seem bright indeed. Consider, again, that it is estimated that the province has less than 30,000 sheep at present, and that its area is nearly 300,000 square miles, and further comment seems unnecessary.

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DISEASES OF SHEEP.

(By J. G. RUTHERFORD, *Veterinary Director General and Live Stock Commissioner.*)

Sheep in Canada are particularly free from disease. The climate of this north land has proven to be particularly healthful for sheep. Alike in the clear, cold climate of the west and the snowy winters of the east, sheep do well, their warm coats protecting them sufficiently, while the pure air and sunshine keep the lungs and consequently their whole system in good order, so that good health is practically assured, if the management is even half what it ought to be. This bulletin would, however, hardly be complete without a chapter on at least the most common ailments which may be now and then met with.

The diseases of sheep may be divided into several classes. First those caused by external parasites such as scab and foot rot; along with these may be mentioned ticks and lice, which when neglected, frequently bring about unthrifty condition bordering closely on disease. Then there are internal parasites such as worms of various forms, which may infest the stomach, the intestines and the respiratory organs or the head.

Digestive derangements, too, manifest themselves at times. To these may be added the diseases and accidents peculiar to reproduction.

Scab.

Sheep scab, when once introduced into a flock, must be dealt with by thorough measures. It is a strictly contagious disease caused by a minute specific mite technically known as *Psoroptes Communis Ovis.* It is so small as to be difficult to discern with the naked eye. This disease generally affects the parts which are covered with wool. It usually begins at the upper part of the body, thence spreading over the neck, shoulders and hips, extends slowly but surely in ever-increasing areas. In two or three months the entire body may be affected. The disease spreads, as a rule, much more rapidly during the winter than in the warm weather. In sheep on grass, after shearing and washing it may remain for a long time in an almost latent condition. Sheep well fed and otherwise strong and healthy resist its ravages in a remarkable way, while those which are thin or badly nourished, rapidly become debilitated, and if left untreated, live but a short time. Affected sheep experience great itchiness with irritation, formation of pauples, inflammation, and the development of crusts or scabs under and near the edge of which the parasite lives. The sheep are restless, they scratch and bite themselves, rub against fences, posts, etc., as if in great torture. The fleece assumes a tufted, ragged and matted condition. Tufts of wool are pulled out by the sheep with the teeth, or are left on fences, posts, etc., where they have rubbed; to each tuft scabs are attached, which are usually replaced at the seat of origin, by thicker or more adherent crusts. The skin becomes more or less bare and furrowed, and from the furrows blood oozes. Without treatment the disease goes from bad to worse, spreading the infection, which is readily taken up by other sheep which may come into contact with a diseased one or with infected objects.

Under the provision of the Animal Contagious Disease Act it is the duty of every owner, on perceiving the appearance of sheep scab in his flock, to give immediate notice to the Minister of Agriculture at Ottawa, and to the nearest veterinary inspector of the Department of Agriculture, of the suspicion or presence of the disease. Instructions will then be issued and carried out according to government regulations.

Two principal preparations are recommended for the treatment of scabby sheep, the lime-and-sulphur dip and the tobacco-and-sulphur dip. The former is recommended and used by the Department of Agriculture. Its preparation is as follows: Take 10 pounds fresh lime and add enough water to make a paste. Sift into the lime paste 24 pounds of flowers of sulphur and stir thoroughly. Boil this mixture in 30 gallons of water for 3 hours, frequently stirring the mixture. The solution should then be a brown or chocolate colour. Allow the mixture to stand for a few hours, preferably

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over night, and then draw off the liquid. Care should be taken not to disturb the sediment, which is slightly injurious to the fleece of the sheep. To this liquid add sufficient water to make 100 gallons. It should be used for dipping at a temperature not lower than 106 degrees, and not higher than 112 degrees Fahrenheit. The hot dip softens the scabs and destroys the mites. The sheep should remain a full two minutes in the tank. The head should be plunged, and if there are thick crusts on the skin the dip should be rubbed into the wool with a stiff brush or otherwise. Two dippings are necessary at intervals of from 10 to 12 days. In very bad cases a third dipping may be necessary. The sheep should be clipped whenever possible before dipping. When the flock has been dipped once, their quarters should be changed; the barns, fences, etc., where they have been kept should be well covered with a lime wash containing at least five per cent of pure carbolic acid or creolin. Further instructions for dipping are given elsewhere in this bulletin.

Foot Rot.

Foot rot is of two kinds, viz., contagious and non-contagious. The latter is a simple disease usually due to excessive wear of the hoof and the irritation caused by the introduction of dirt to the sensitive tissues of the foot. It is, therefore, most prevalent on low, wet land and in filthy yards and barns.

Prevention is better than cure. Sheep should not be fed in wet, muddy or filthy places. Their hoofs should be examined and pared when necessary to remove superfluous horn. When the disease appears in a small flock the hoofs should be trimmed down closely and the feet washed or soaked in a solution of copper sulphate, 1 ounce to 2½ pints of water, then dress with watery solution of chloride of iron or with chloride of antimony, or preferably with a mixture of equal parts of chloride of antimony and tincture of myrrh. After such dressing the raw surfaces should be protected by a coating of pine tar or gutta percha varnish. Then remove the animals to a dry, clean pasture. If the disease is not of long standing this treatment will generally effect a cure, although in confirmed cases where much destruction of tissue has taken place it may be necessary to repeat the dressing several times.

For large flocks on the range or elsewhere a more general treatment is necessary. A suitable solution is made in the proportion of ten pounds of copper sulphate, dissolved in five gallons of water. The solution is put in troughs two or three inches deep. The sheep after being driven through water, preferably running water, to cleanse their feet, are, by using a narrow chute, made to pass one by one through the preparation. As an alternative to the above, affected sheep may be held for a short time on a floor sprinkled to a depth of three inches with freshly slaked lime.

Canadian sheep men may be thankful that the contagious form of foot-rot is almost unknown in this country. The few cases seen are as a rule in recent importations. For this reason imported sheep and others that have travelled in dirty cars should be carefully examined on arrival and treated at the same time as they are dipped. Prevention of the trouble is much cheaper than effecting a cure. Treatment is similar to that described above, although owing to the persistent nature of the disease recovery is generally much more protracted. As in this form the trouble begins in the skin of the interdigital space and works downwards through the sensitive laminæ, it is advisable to dress the skin between the dew-claws with a mixture of one part carbolic acid to ten parts of glycerine, or with vaseline twenty parts to one part of iodine.

Ticks and Lice.

In examining sheep for skin disease it is well to remember that they are subject to infestation with lice and ticks. Of these the louse is most to be dreaded, both on account of the rapidity with which it multiplies and the serious effects which it is liable to produce on the health, as well as the wool, of its unwilling host. The tick, which by the way is not a true tick but really belongs to the louse family, while much less prolific, develops rapidly and is most frequently troublesome in lambs, although

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like the white louse it is found on sheep of all ages. As in other species of domestic animals, these parasites are most frequently found and appear to flourish best on thin and badly nourished sheep rather than on those in good condition. When present in any number both ticks and lice induce great irritation, causing the sheep to scratch with the hind feet, gnaw the sides and rump and rub on any convenient object in a manner very similar to those affected with scab. In this way the fleece is often seriously depreciated, while from its mode of feeding, the louse also cuts the fibre near the root, thus greatly lessening the growth and value of the wool. The effects on the skin of the attacks of these animals, and especially that of the white louse, may very easily be mistaken for scab unless a careful examination is made. It cannot, however, be too often repeated that there is no excuse for error in a diagnosis of this kind, for although scab, lice and ticks may undoubtedly exist on the same animal, a sufficiently close and painstaking investigation, with the aid of a moderately powerful pocket magnifying glass, will enable any intelligent observer to reach a definite conclusion as to the nature of the trouble, whether it be simple or compound. It must be borne in mind that the presence of lice is no proof that a sheep is free from scab. While the converse is also true, it is not so important, as while lice and ticks are disagreeable and unwelcome guests, their presence is a matter of slight consequence, especially to the sheep owning public, as compared with that of the smaller but more deadly and persistent scab mite.

Stomach Worms.

The stomach worms, of which there are several varieties, are generally somewhat under an inch long and live in the fourth stomach. Lambs suffer particularly from their attacks, which begin any time after the little fellows start to eat grass, and may continue even till cold weather comes. Some of the symptoms in lambs and sheep are loss of flesh, dullness, languor, failing appetite, thirst, occasional colics, black diarrhœa, dry wool, chalky skin, and a general anæmic condition. Lambs and weak sheep are especially afflicted by these pests, which frequently cause death, while strong healthy sheep, though infected, may show but little evidence of the fact.

The worms in the stomach produce eggs, too small to be seen by the naked eye. These pass out of the animal in the droppings and hatch in a temperature of 40 degrees Fahrenheit or over. Their most favourite hatching place is in muddy stagnant water. They will not develop in pure water, and when deposited there, generally die in the course of a few weeks. These little worms grow until they are about one-thirtieth of an inch in length. After being swallowed by a sheep or lamb they arrive at maturity in three weeks or a month.

Good management seems to be the best remedy for these pests. Keeping the digestive organs in a healthy condition by the use of roots in winter and vetches, rape or other succulent plants in summer, along with other foods, seems to be a preventive. A liberal allowance of salt should be furnished regularly. In infested districts the pasture should be hurdled off and the sheep kept on one plot for about ten days and then moved to the next. This should be done from June to October. This method keeps the sheep from feeding over infested pastures, preventing reinfection, as at least two weeks are required for the eggs to hatch. Pastures known to be infected should either be ploughed up or thoroughly dressed with lime and salt.

Many remedies have been tried with more or less success. Gasoline, coal-tar, lysol, creosote, kamala and bluestone (copper sulphate) are used. Possibly the last named is surest to reach the fourth stomach of the animal, which the parasites mostly inhabit. This treatment has been used successfully in Cape Colony and is recommended by the authorities there. The bluestone should be pure and clear blue in colour. Dissolve 2 ounces of finely powdered bluestone in 1 gallon of warm water, or better, dissolve it in a quart of boiling water, then add the remainder and mix. The doses are as follows:—

Lambs three months old 1 ounce of the solution.
Lambs six months old 1½ ounces of the solution.

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Sheep twelve months old 2½ ounces of the solution.
Sheep eighteen months old 3 ounces of the solution.
Sheep twenty-four months old 3½ ounces of the solution.

Care should be taken to give the right amount according to the age of the sheep. When kamala is used it should be given once a day in doses from half a drachm to a drachm in thick gruel, treacle or raw linseed oil. Picrate of potass, which is highly recommended by continental authorities, is administered daily in doses of from 5 to 20 grains, according to age and weight. It is said to be less irritating than any of the other remedies mentioned.

Except in one or two localities Canadian sheepmen have not suffered to any extent from the ravages of this pest.

The Grub Worm.

The grub worm is found in the sinues of the sheep's head. It is the offspring of the sheep gadfly (*œstrus ovis*). The eggs are deposited in the sheep's nostrils and when hatched the worms crawl up into the sinuses and become full grown grubs.

Prevention is undoubtedly better than treatment, although skilful shepherds are often able to relieve the sheep of their unwelcome guests by trephining the sinuses. Feed well and keep the sheep strong and healthy. Tar or fish oil smeared on the noses of the sheep or placed on the edge of narrow salt troughs or around 2-inch auger holes in a log in which salt is fed, will help to keep the flies away. A dark place during the midday heat lessens the attacks of these insects. Access to a piece of summer fallow where the sheep can stamp and raise a dust also helps to discourage the tormentors. During the months of July, August and September sheep should, if at all possible, be kept on pastures free from trees or shrubbery of any kind.

Tapeworm.

The sheep is known to harbour more varieties of the tapeworn than any other of our domestic animals save the dog. Eight species are found, of which, however, by far the most common in America is that known as the *Tænia expansa*. This tapeworm varies in length from three to six yards, and from one-twenty-fifth of an inch in width at the head to one-half an inch at the tail. It is composed of segments, dull yellowish white in colour, and about one-fourth of an inch in length and a little more in breadth, any one of which if picked up by another animal may grow into a mature tapeworm. Sheep suffering from tapeworm first show paleness of the skin and mucous membranes, accompanied by brittleness of the wool and rapid loss of condition, although the appetite may continue good or even excessive. This is followed by digestive disturbances, irregular cud and offensive breath, bloating, constipation or diarrhœa, the foeces being yellowish in colour and often containing segments of the worm. The sufferer becomes more and more feeble, and unless prompt relief is afforded death soon follows, usually preceded by convulsions and violent diarrhœa. Fortunately tapeworm is not very difficult to eradicate. The sheep should be fasted for from twelve to twenty-four hours. An injection of warm water given a few minutes before will help to promote the rapid action of the medicine. The dose, 1 drachm of the oil of male shield fern in from 2 to 3 ounces of castor oil for a mature sheep, is best given when the sheep is standing and after a fast of twenty-four hours, as then most of the dose passes to the fourth stomach. Kamala in doses of from 1 to 1½ drachms in thick gruel or treacle, followed after three hours by from 3 to 4 ounces of castor oil, is also often effective. For small lambs one-fourth of these doses is sufficient, and as the size and age increases the dose may be given to suit. In drenching sheep the mouth should not be raised above the level of the eyes, lest part of the dose pass into the lungs. After being treated sheep should be shut up for at least thirty hours to prevent the segments of the worm expelled being scattered about and much ground being infected. Subsequently they should be put on fresh ground in order to avoid the risk of reinfection. Tapeworm is most common in wet years and in wet, muddy

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districts, and although the life history of the parasite is not fully known, it is probable that it finds direct access to the sheep in its larval or cystic form by being taken up with the grass. Infected pastures should, therefore, be burned over, ploughed up if possible or top dressed with salt, nitrate of soda or gas lime. Droppings should, when practicable, be collected and carefully burned.

Gid.

Gid, Sturdy, or 'Turnsick' is caused by an encysted parasite, *cenurus cerebralis*, in the brain. This is the ovum of a species of tapeworm which infests dogs, foxes and wolves. The eggs pass out of these animals and infest the grass or water, in either case under favourable conditions, retaining their vitality for several weeks. The sheep swallowing these become infected. The young worms are hatched in the stomach and penetrate its walls, getting into the blood. Many of them becoming scattered through the muscular and other tissues suffer degeneration and perish. Those which reach the brain or spinal cord, which they do in about a week from the time they are swallowed, burrow in through the tissues until a suitable place for development is reached. In this stage many die, but such as survive form a small transparent bladder, gradually increasing in size from that of a pinhead to that of a hazel nut. On reaching the dimensions of the latter, which is generally about two months after infection, numerous new tapeworm heads, often many hundreds, are formed in each cyst, the latter continuing to grow until the death of the patient, frequently attaining the size of a walnut. This, which is known as the cystic form, is only seen in sheep whose brains contain but a few cysts, and is that which produces the symptoms of genuine gid or sturdy. Where the embryos in the brain are numerous acute inflammation of that organ generally destroys the animal before the close of the first month after infection. The mortality is sometimes very large. The disease is most in evidence in wet seasons, moisture being necessary to preserve the fertility of the eggs after leaving the original canine host. For the same reason infection is more common in the spring and fall than in the summer or winter.

It is not until after the embryo has reached the brain that the symptoms of gid make their appearance. The first of these generally noticed is dullness, followed by wasting and disinclination to move. The head is carried low or drawn to one side, while impaired vision is a common feature; the animals sometimes become totally blind, while in other cases one eye only is affected. Squinting is frequently noticeable, or the eyes may be drawn backward and present a sunken appearance. The locomotive powers soon become affected, the animal losing control of one or more limbs and exhibiting, as the disease progresses, marked peculiarities of gait and action, these of course varying widely in different cases. As already stated, death is not uncommon at this stage, being due to general brain inflammation and consequent functional derangements.

When, however, the patient survises this stage, which is only the case when the encysted parasites are few in number, the true symptoms of turnsick usually begin to show themselves. The affected animal may travel for hours in a circle, sometimes following a regular track, while in other cases the circle becomes larger or smaller with each completed round. In the latter case the animal frequently concludes the performance for the time by turning as if on a pivot, until losing its balance it falls exhausted, only to recommence its eccentric movements when sufficient strength returns. It is sometimes possible to locate the exact seat of the cyst in the brain by a careful observation of the vagaries of the patient. When only one cyst exists the animal will, as a rule, turn towards the side on which it is situated, but this is not an infallible guide, as it is not uncommon to have two or more cysts located in different parts of the brain. When, however, one cyst only exists, the rule above mentioned generally holds good, in which case the eye on the opposite side is usually blind from amaurosis (glass eye). If the cyst is situated near the front of the brain the patient steps high and keeps the head drawn backward. If the cyst is in the posterior part of the brain the animal will either lose all power of movement or will turn towards the wind, holding the head high and well forward.

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Skilled shepherds with long experience of the disease become very expert in locating the exact seat of the cysts, and some claim that when superficially situated the bone immediately over them becomes thin and softened. When the affected animal is valuable and the cyst can be located, the skull may be carefully trephined and the bladder and its contents removed. In ordinary cases the best plan is undoubtedly to slaughter the affected sheep and burn the head. If the latter is eaten by a dog, wolf or fox, the worm grows in this new host to maturity and produces eggs. This round is kept up. It is well also to rid the farm of dogs, or if this is impossible, to rid the dogs of tapeworms by giving them at least twice a year, after starving them for twenty-four hours, a full dose of some reliable vermifuge, such as kamala, areca nut or male fern, followed by a purgative. The dogs undergoing this treatment should be kept shut up and all material passed by them carefully burned or treated with quicklime. Inquiry recently made indicates that gid is almost unknown among Canadian sheep, but imported sheep, and especially imported dogs, should be closely watched for some time after arrival.

Acute Indigestion.

Acute indigestion in sheep frequently takes the form known as hoven or bloat, which consists of the fermentation of food and the consequent formation of gas in the first stomach or rumen. It is generally due to sudden change of food, and is most often seen when hungry sheep are turned into clover, rape or alfalfa, or allowed to have access to frozen turnip tops. Under such circumstances it not unfrequently affects a considerable number of animals at once, in which event it is necessary to take prompt measures to avert heavy loss. If observed in the early stages a good remedy is half an ounce of hypo-sulphite of soda mixed with a drachm of ginger in ½ a pint of water, to be followed later, unless permanent and effective relief is obtained, by from 4 to 6 ounces of raw linseed oil, to which may be added ½ an ounce of turpentine.

If the distension is extreme the paunch may be tapped with a trocar and canula. This is done on the left side at a point midway between the point of the hip and the last rib, and a similar distance from the transverse process of the backbone, which may be felt towards the upper part of the paunch. It is necessary, especially in fat animals, to be careful in locating the seat of operation, as otherwise serious injury may result to one or other of the internal organs. The wool should be carefully parted so as to avoid the carrying of strands into the wound to cause subsequent irritation and suppuration. Every sheep owner should keep a trocar and canula where it can be found at a moment's notice. Where the proper instrument is not available it may, in an emergency, be better to risk puncturing the paunch with a pocket knife rather than let the animal die unrelieved, but the practice cannot be recommended, inasmuch as when the paunch begins to collapse, some of its contents are almost certain to escape into the abdominal cavity unless the opening is protected by the canula.

Spasmodic Colic.

Spasmodic colic is an affection of a different nature, and although sometimes due to the causes mentioned as producing acute indigestion, is more apt to be produced by other dietetic errors such as the feeding of lambs with cows' milk or changing them too suddenly and completely from a milk diet to solid food. It may also be induced, both in lambs and in adult sheep, by acrid herbs or by any unusual diet. The pain should be relieved by the administration of an anodyne mixture such as a teaspoonful each of laudanum and sweet spirits of nitre, dissolved with a teaspoonful of ginger and two teaspoonfuls of baking soda in ½ a pint of water. It may be necessary to follow up with a dose of raw linseed oil in order to relieve the bowels and remove the irritant, for which purpose also injections of warm water will be found useful.

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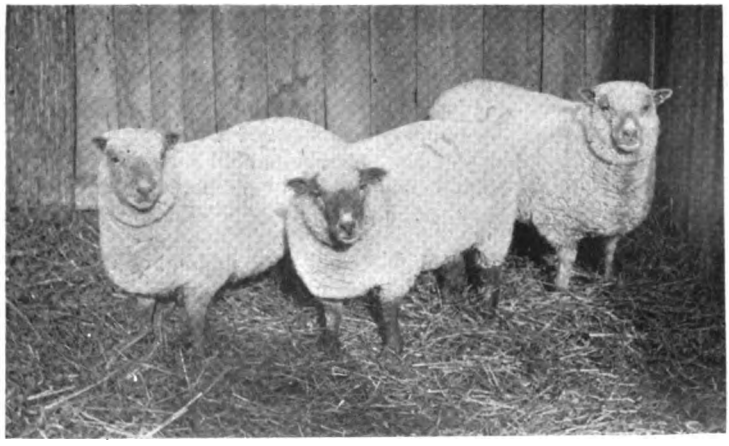
Fig. 70—Suffolk Ram.



2514—13. Fig. 71—Southdown Ewes.

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Constipation or Stretches.

Constipation is not uncommon in sheep that are kept on coarse dry feed. The name indicates the nature of the symptoms shown, and this condition can best be relieved by the administration of a cathartic. For this purpose 6 to 8 ounces of raw linseed oil, with from 2 to 4 drachms of turpentine, may be given. Injections are also recommended. The tendency to constipation is best combatted by the judicious feeding of roots and other succulent feed through the winter, when it is most frequently seen.

Inflammation of the Bowels.

Inflammation of the bowels, properly so called, is almost unknown in sheep, although as in horses there are many conditions which produce acute inflammatory action in some one or more of the internal organs, giving rise to the symptoms generally associated with the name given above. The symptoms presented are similar to those of colic, but much aggravated, violent and almost constant abdominal pain being present. The medicinal treatment is similar to that for colic, but larger doses of the anodyne mixture may be given and repeated at intervals of several hours should the pain continue. Relief may sometimes be afforded by the application of mustard to the abdomen. Treatment is frequently unsuccessful, but should be persisted in, as such attacks occasionally terminate in diarrhœa, which, after being allowed to continue for a reasonable length of time may be controlled by the administration of starch or flour gruel, to which may be added the whites of eggs and a little whisky or brandy.

Diarrhœa.

Diarrhœa is as a rule the result of bad management, overfeeding with succulent food, or an indigestible diet, such as unripe food or frozen grass—that caused by the latter being a very serious form. It may also be caused by a sudden change to a diet of roots, especially mangels, and is also observed among sheep turned for the first time on alkali lands, and in those having access to water strongly impregnated with alkali. Treatment consists in removing, if possible, all the inciting causes and by changing the diet to dry feed of a simple character. It is sometimes best where the trouble is evidently due to an effort of nature to get rid of irritation, to assist the process by the administration of a mild laxative, and for this purpose a few ounces of castor oil may be given, combined with a drachm each of laudanum and ground ginger. Should the diarrhœa persist after this treatment, it may be combatted by the administration of starch or flour gruel, combined with whites of eggs and a little stimulant, should the need of the latter be indicated.

Wool Balls.

Wool balls in lambs' stomachs may cause considerable loss, particularly among long wool breeds, if the habit of wool eating is persisted in for a sufficient length of time to allow of the formation of many of these peculiar concretions. Digestive troubles, a craving for salt or some constituent lacking in the food may cause the lambs to chew wool; biting the sides to get rid of ticks is a common cause, and for this reason lambs should be dipped together with the ewes after the latter are clipped. The loose wool should be cut from the ewes' udder to prevent it getting into the lambs' mouths when sucking. Confinement should be avoided. The flock should be turned out on a wide range if possible as soon as the habit is noticed, and the separation of the first offenders should be effected at once, as imitation is a frequent cause of spreading the trouble. Free access should be given to salt, phosphate of lime or bone meal. Linseed oil in appropriate doses may afford relief, but if much wool is swallowed the balls may block the small intestine and cause serious derangement of the digestive functions, followed by emaciation and even death.

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Derangement of the Urinary Organs.

Many of the diseases affecting the kidneys and bladder of other species of animals are almost unknown in the sheep, and when they do occur, being difficult of diagnosis, are seldom recognized and still less frequently successfully treated. Trouble is occasionally caused, especially in male animals, by the formation of calculi, which, however, seldom give rise to definite symptoms except when lodged in the urethra. In this situation they give rise to serious difficulty in passing urine, and are, in fact, the most frequent cause of what is known as 'stoppage of the water.' The formation of calculi is induced by the too free use of highly nitrogenous foods and those rich in sugar and phosphates. Among the articles of diet held by different authorities to be responsible are peas, beans, maize, mangels and new mown clover. The condition is also more frequent in limestone districts, especially where the water supply is strongly impregnated with lime salts. The affected sheep generally lies down, and on being made to rise gives a peculiar spinal jerk, followed in some cases by the passage of a few drops of water. He is very uneasy and restless, changing his position frequently, respiration is hurried, and often each breath is accompanied by a painful grunt. The urine passed is thick and cloudy; the appetite fails; fits of shivering follow, and unless relief is afforded the bladder ruptures or acute urine poisoning sets in, either of these conditions being rapidly fatal. When, as is not unfrequently the case, the obstruction is at or near the external opening of the urethra, relief can often be given by clipping away the wool, and removing the accumulation, which is often more of a sabulous mass than an actual stone. Often the urethra is simply blocked by a mass of sediment behind the worm-like appendage at the end of the tube, and in such cases when manipulation fails, the worm itself may be removed, thus affording relief. In all cases in which the obstruction is situated in front of the peculiar flexure of the urethra which characterizes that passage in sheep as well as in cattle, an effort should be made to secure its dislodgment by gentle massage, fomentations and the injection of olive oil into the urethra. Actual incision into the urethra is difficult and dangerous, and should not be attempted by any one except a skilled operator, and even then only as a last resort. Medicinal treatment is of little value, although the administration of belladonna in doses of from ten to fifteen grains may occasionally assist in relieving the tension of the parts. Benefit sometimes follows the administration of a dose of physic, and in these cases Epsom salt is, for obvious reasons, the most suitable agent. The dose is, for a full grown sheep, about six ounces dissolved with a handful of salt and two drachms of ginger in at least a quart of warm water.

Abortion.

Abortion may be caused in different ways. Injuries sustained by crowding through doors, hooks from cattle, or chasing by dogs have caused many a ewe to give birth to an immature lamb, usually dead. Ergotized grain or hay, smutty grain or its straw, frozen turnip or beet tops and impure water are other sources of this trouble. Careful management, clean, sound food and pure water are the best preventives of sporadic abortion. Some of the symptoms are a loss of appetite, dullness and desire on the part of the ewe to isolate herself from the flock. Generally abortion takes place before any symptoms are noticed, but it is occasionally necessary to remove the fœtus and placenta lest blood poisoning set in. Both fœtus and afterbirth should in all cases be burned, and the uterus flushed out twice a day for several days with a three per cent solution of creolin in warm water.

Epizootic abortion is caused by a germ allied to the common moulds. It is contagious and spreads rapidly through a flock unless proper precautions are taken. An animal which has aborted should be at once removed from the flock, and the uterus injected with the creolin solution mentioned above. Fœtus, afterbirth, etc., should be burned, and the place where the main flock are kept should be thoroughly cleaned. All bedding should be burned and the floors covered with sawdust containing ten per cent by weight of crude carbolic acid. The walls and ceilings should be whitewashed

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with lime and carbolic acid in the proportion of one pound of commercial carbolic acid to each five gallons of lime wash. Rams that have served affected ewes should be disinfected by syringing into the sheath a five per cent solution of creolin, or a 1 to 1,000 solution of bi-chloride of mercury. For this purpose a fountain syringe is the most convenient instrument. Such rams should not be used again for breeding until a considerable time has elapsed.

Eversion of the Womb.

Some time after the birth of a lamb (usually a case of difficult parturition), a red bladder-like body may be seen protruding from the vulva. This is due generally to a weakened condition of the ewe, and consequently of the ligaments by which the womb is attached, and also the failure, owing to exhaustion, of the *os uteri* to close normally. It frequently follows the retention of the afterbirth, when the whole organ is ejected, together with the membranes. In such cases the placenta should be separated at each cotyledon to prevent bleeding. After removing the placenta or afterbirth, the organ itself and the surrounding parts should be washed clean with a two per cent solution of creolin or carbolic acid. Next have an assistant place the ewe on her back and grasping her hind legs raise her hindquarters nearly a foot above the floor or ground. In this position the womb may be most easily returned. The operator should next flush out the womb with a pint of luke warm water in which a little powdered alum has been dissolved. The ewe should be tied up for a few days in a narrow stall by herself, with the bedding built up in such a way that her hind parts are about 6 inches higher than her front parts. If straining continues and does not yield to medicinal treatment, a simple truss may be applied in the manner familiar to most shepherds. Stitching the vulva is not recommended, although it may be necessary when the attendant does not know how to make and apply the truss. In no case should more than two or three stitches be inserted.

Sore Teats.

Wet, cold weather and damp or wet quarters cause sore teats in ewes. Sometimes the lambs bite the teats because of a lack of milk to satisfy their appetites. Any good healing salve will prove beneficial. Equal parts of sweet oil and glycerine applied two or three times a day has given good results.

Caked Udder.

Swollen udder is a common ailment at lambing time and again when the lambs are weaned. The heaviest milkers are most subject to it. The majority of cases are traceable to neglect on the part of the shepherd. Heavy feeding before lambing time is a frequent cause; exposure to draughts or a wet bed are responsible for many bad cases. These are easily avoided. At weaning time, to prevent swelling, the ewes should be milked out for two or three successive mornings, and this should be continued in such as show any tendency to cake.

Inflammation of the Udder or Garget.

Inflammation of the udder or garget is a very serious condition, and not at all uncommon. It may follow caked udder or may be induced by exposure to cold and wet, particularly the latter, to bruises from the head of the lamb or from lying on stones or dry, lumpy soil. It occurs most frequently in wet seasons and occasionally causes the death of the ewe from mortification. Instances are on record where the specific contagious inflammation of the udder which affects cows, has been transmitted to ewes occupying the same quarters. In the treatment of severe cases of caked udder or of inflammation of that organ, it is advisable to administer about 4 ounces of Epsom salt dissolved in ½ a pint of warm water. Bathe the udder with water as warm as

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can be borne for at least half an hour, then dry thoroughly and rub well with an ointment composed of lard 8 parts, belladonna 1 part. Keep the ewe in comfortable quarters and repeat the local treatment as required. If any tendency to suppuration is observed, it is advisable to apply heat and moisture, and for this purpose a poultice of spent hops is very suitable, or the udder may be packed with clean woollen waste, saturated with hot water and kept in position with a cloth, preferably waterproof. Feed lightly on clover hay and warm bran mash and give chilled water to drink. As abscesses show signs of pointing they should be opened with a sharp knife and treated as indicated below.

Abscesses.

Abscesses in sheep are not uncommon, being, in these animals, easily induced by bruises and other comparatively slight causes. As soon as the presence of pus is definitely ascertained the abscess should be opened and the cavity injected with a 2 per cent solution of carbolic in warm water. This should be repeated from time to time until the wound heals.

Goitre.

Goitre shows itself as an enlargement of the thyroid gland which is situated beneath the throat close to the head. Sheep of all ages are subject to it, but it is most frequently seen in lambs, causing heavy loss. Authorities do not all agree as to the cause. It is considered hereditary, while it is also undoubtedly, in some cases, due to malnutrition, apparently arising from certain conditions of soil and water as yet imperfectly understood. Insufficient exercise, the mating of overfat rams and ewes, inbreeding and weakly constitutions are other causes given, but it is improbable that any of these produce it unless the local conditions are favourable to its development. Lambs afflicted with goitre are frequently born dead or die shortly afterwards.

Curative treatment for goitre is but little resorted to for the reasons that young animals seldom respond satisfactorily. Mature goitred sheep (which in no case should be bred from) are only slightly inconvenienced by the disease and may be readily fitted for the block. The most experienced sheep breeders avoid the use of a goitred ram, knowing well that he is likely to leave a stunted progeny. The safest plan is to breed only from sound stock, the ewes of which, during the season of pregnancy should be given ample opportunity for exercise, with a plentiful supply of plain and suitable food.

Catarrh.

Catarrh begins with frequent sneezing, a discharge of mucus from the nostrils, inflamed eyes and loss of appetite. If allowed to go on it may become malignant, in which case the lining membranes of the nasal passages, throat, and even the stomach and intestines may become affected. Death frequently results, while such animals as recover from attacks of this extreme nature are generally almost worthless. Simple catarrh may be due to infection, and its development is favoured by changes of temperature, exposure to cold rains or chilling winds or by confinement in a draughty or poorly ventilated building. Malignant catarrh is seldom seen except when the conditions are unsanitary. Strong, vigorous sheep in good condition are less liable to seizure, and if attacked, are easier to treat and make a better recovery.

The first treatment (which it is advisable to try before the symptoms appear) is to place the animals in a clean airy place, dry underfoot and with good shelter easily accessible. When a nasal discharge is observed, flax-seed tea may be given three times a day, with plenty of good food. Warm mashes are beneficial, while in bad cases marked relief is afforded by steaming the head with hot water in which a little carbolic acid has been dissolved. Some rather ancient authorities recommend blowing different mixtures into the sheep's nostrils, but little benefit is likely to result from treatment of this kind.

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Soreness of the Eyes.

Sore eyes may be due to enzootic ophthalmia or to constitutional causes. Serious irritation is often induced by the entry of dust or chaff into the eye. Exposure to severe weather or draughts, or a continued heating diet occasionally causes more or less severe inflammation of the eyes. Lambs are not infrequently affected, and in them, as in fact in all severe cases, the tendency is to lose flesh rapidly. Treatment consists in examining the eye for foreign bodies, which, if present should be removed if possible. A little cocaine solution, which can be procured from any druggist, is especially convenient in dealing with this sensitive organ. In this, as in all other cases, the eyes should be well bathed with warm water, after which a solution of 2 grains of sulphate of zinc to 1 ounce of water should be introduced with an ordinary dropper or a small glass syringe. A mild laxative or at least a laxative diet is to be recommended and it is well to protect the eyes from exposure to strong light.

Enzootic ophthalmia is, of course, contagious, and for this reason it is advisable to isolate at once any sheep having sore eyes, except of course those in which, on examination, the trouble is found to be due to the entrance of some foreign body or other well defined local cause.

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THE CANADIAN WOOL INDUSTRY.

Sheep raising in Canada is carried on more for the production of mutton than of wool. That is to say the first object of the Canadian sheep raiser is to produce mutton, and secondly to get what he can without special care for his annual crop of wool. In this respect the sheep raising conditions in Canada do not differ materially from those in other parts of the world where advanced agriculture is carried on. Simple wool growing cannot be maintained in any country where land has any considerable value. As civilization has advanced and the processes of agriculture have improved, one country after another has ceased to grow wool for itself alone; mutton has become the principal and wool the incident of the business. This transition was accomplished in England first by the improvement of the Leicester, the Southdown and the Hampshire. France by slow degrees transformed the Rambouillet Merino into a mutton breed of no mean quality. Australia and also New Zealand are becoming mutton shipping countries, and the United States is rapidly getting away from the fine woolled breeds to crosses of British varieties for the purpose of increasing the production of mutton. It is toward this end that Argentine breeders find it profitable to pay English farmers long prices for Lincoln rams, while the same motive prompts the demand from the ranges of the Western States for Canadian-bred long-woolled males.

Canada has never given special attention to wool raising. True, the foundation stocks of the western range bands approached more nearly the wool than the mutton type, but each succeeding year finds an improvement in the direction of the mutton side, with a corresponding tendency towards coarser wool. Much Canadian wool is of excellent quality as compared with its own class from other countries, but the very general lack of care given to its production and handling has given it a rather indifferent standing in the wool markets of the world. As a matter of fact the Canadian wool supply has little interest for the large wool markets. The entire exportable supply is not great and it is of so mixed a character that more than very meagre shipments of definite classes are out of the question. Our total annual export has not for a number of years reached two million pounds—about one-fifth of the total shorn crop—and the great proportion of this has gone to the United States.

The Annual Crop.

The annual wool clip of Canada in recent years amounts in round numbers to twelve million pounds, divided by provinces about as follows:—

	Lbs.
British Columbia	95,000
Alberta	631,000
Saskatchewan	496,000
Manitoba	135,500
Ontario	5,519,500
Quebec	2,670,000
New Brunswick	986,000
Nova Scotia	1,189,500
Prince Edward Island	385,500
Total	12,108,000

These figures represent the total weights at the farms, including both washed and unwashed wool. In the province of Ontario from 70 to 80 per cent of the wool is washed. West of a line drawn north from Kingston the usual practice is to wash the wool on the sheep, whereas east of that line, also in Quebec and the maritime pro-

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vinces, tub washing is the rule. In the western provinces wool washing is little practised by the sheep raisers, and then only in British Columbia. Sheep washing was tried in Manitoba, but the scarcity of running streams and the natural hardness of the water rendered the operation difficult and unsatisfactory, and it has been discontinued. Practically all our range wool is marketed in the grease, which accounts for its heavy shrinkage owing to unavoidable accumulations of dust and dirt gathered during the dry, warm weather which is frequently more or less windy.

Apart from the range wool, which contains more or less Merino character, Canadian wool ranges from medium clothing to coarse combing, varying in proportion to the prevailing breeds. On the evidence of the most extensive dealers and manufacturers the finest grades, outside of the province of Saskatchewan and Alberta, are found in the maritime provinces, the Eastern Townships of Quebec, the Ottawa valley and in British Columbia. Even the common or unimproved flocks of these districts produce a relatively fine grade of wool, while the improved flocks possess more of Down than of long-wool character. In addition to this the soil and the climate of the sections referred to, more especially the maritime provinces, appear to exert a favourable influence on the wool as regards softness of texture and working quality. In these sections fully 60 per cent of the clip is classed as clothing wool and 40 per cent as combing, whereas the crop shorn in central and western Ontario, Manitoba and parts of Quebec the proportion of long combing wool reaches quite 75 per cent.

As already indicated, the great bulk of the wool grown on the ranches of Saskatchewan and Alberta occupies a class of its own among Canadian wools. The yearly clip approaching 1,000,000 pounds in the grease, representing from 400,000 to 500,000 pounds of scoured wool, is classed as fine medium. That is to say it is finer than the finest grown in other provinces and coarser than the fine wools clipped from Merino sheep in South Africa, South America and Australia, of which large quantities are imported into Canada each year. It is the regret of the woollen manufacturer that this wool is each year growing coarser, the result of additional mutton crosses upon the Merino stock originally brought from Montana.

The Export Trade.

The United States has always been the chief outside market for Canadian wool. Great Britain takes a small quantity each year, and a few small shipments are occasionally made to Newfoundland. The annual exports to the United States for the past thirty years have usually been above the million pounds mark; less than half a dozen times it has fallen below the million, and twice that number of yearly periods it has exceeded the two million mark. In 1855, 3,550,000 pounds crossed the United States boundary, while during the three years commencing 1895 the export ran up to 5,449,955, 3,851,432, and 7,499,949 pounds, respectively. The great increase during these years was due to the withdrawal of the customs duty on wool entering the United States as a condition of the Wilson-Gorman tariff. The year later (1898), when the tariff had been restored, the amount fell to about 1,000,000 pounds, and in 1899 to some 22,000 pounds. Since then it has been fairly constant, running from a little under 1,000,000 to about 2,250,000 pounds.

Practically only one class of wool goes from Canada to the United States—combing wool of a length of five inches and upwards, washed on the sheep's back. The United States market does not want clothing wool or pulled wool from outside, and their tariffs have been framed accordingly. In this respect a preference is shown wools classed as Cotswold, Leicester and Lincoln, on which the tariff is 12 cents per pound. In order to admit of classification the wool must be presented in individual fleeces and since the seller could not afford to pay duty on dirt, all our wool going to the United States must be washed before being shorn. An extensive Canadian buyer who secures a good share of the clip from western Ontario gave the writer the following figures as representing the classification of an average lot of 15,000 pounds: Combing (Leicester, Lincoln and Cotswold) 10,500 pounds; clothing (Downs and similar wool) 3,300 pounds; unwashed 600 pounds; rejects (cotted, unduly coarse,

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dead, filthy, etc.) 650 pounds. The first of these classes is in very limited demand in Canada and goes chiefly to the United States, the others are practically all used up in Canadian mills.

The exports to Great Britain have only once exceeded half a million pounds in one year (1879), when 640,000 pounds were shipped. Prior to 1887 fairly large shipments were made each year, but from that year until 1895 little or no Canadian wool found its way to Great Britain. Since that time the average has been about 200,000 pounds, the quantity for 1906 being 200,039, and for nine months of 1907, 223,347 pounds. Except for a few lots of range wool the exports to Great Britain have consisted of washed clothing wool.

Domestic Consumption.

The comparatively small export of wool leaves about 10,000,000 pounds of shorn crop for domestic use. It is impossible to properly estimate the quantity that is still worked up at the farm. In New Brunswick, Quebec and to some slight extent in the other provinces, home carding and spinning are still in vogue, and no doubt considerable wool is used in the homes for making mattresses, quilts, etc. The quantities used in these ways are year by year decreasing, thus augmenting the supply to be taken care of in the mills. In addition to 8,000,000 to 9,000,000 pounds of home grown wool consumed in the Canadian mills large quantities of imported wools are brought in each year. For the years ending June 30, 1905, 1906, and the first nine months of 1907, the quantities imported were respectively as follows: 7,617,211, 6,311,837, and 3,928,791 pounds. These wools, with slight exception, are said to consist of fine Merino qualities such as are not grown in Canada, and are required in the manufacture of fine goods, such as flannels, fine tweeds, meltons, beavers, whipcords, covert cloths and fine rugs. These wools also enter very largely into the manufacture of underwear and other fine knitted goods.

The mills using Canadian wools manufacture such staple lines as blankets, mackinaws, friezes, etoffs, tweeds, homespuns, sweaters, yarns, etc., each of which fills a large place in the requirements of the ever increasing population. Many of the smaller mills depending upon the local wool supply use Canadian wools almost exclusively. These manufacture several lines of goods, and in this way consume the different grades of wool produced. With few exceptions what may be termed the large mills import most of their wool and mix with it a little Canadian and a certain proportion of shoddy and of cotton.

That there will always be a strong demand for the substantial goods made from the finer grades of Canadian wool admits of no argument. Their wearing qualities appeal to the rural dweller and the more frugal of the urban population. Just now the fashions in both men's and women's clothing call for a fine fabric presenting a smooth surface. These are made from Cape, Australian and other Merino wools, and in the cheaper grades shoddy and cotton are very largely utilized. Sooner or later, however, the fashions will change and the coarser fabrics will command the attention of the purchasing public. The reversion to Canadian wool goods will be hastened by reason of the short life of the composite cloth, which soon shows wear on the exposed parts. Cloths carrying a high percentage of shoddy and cotton soon lose shape. It is this peculiarity of the popular clothing that gives much work to the numerous repair shops and pressing wardrobes that are springing up in every town and city. It is safe to predict that the fashions in men's clothes, more especially business suits, will revert toward the tweeds such as are readily made in Canadian mills from Canadian wools, replacing the smooth imported worsteds now so generally worn.

Defects of Canadian Wool.

LACK OF UNIFORMITY.

Canadian wool, as compared with that grown in countries devoted largely to sheep raising, and where the climate is never severe, presents defects that are complained of

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by every wool dealer and manufacturer. The very general lack of uniformity in breed naturally gives a mixture to the character of the wool. This presents a difficulty to the manufacturer of special lines who desires to purchase a large quantity of one class. He is now compelled to purchase more or less mixed lots and pay men at his mill to re-sort them. This defect will continue until we so increase our sheep stocks that extensive Canadian wool markets are developed to better classify and take care of the output. To indicate the insignificence of the Canadian wool crop of some 12,000,000 pounds of shorn wool and upwards of 1,000,000 pounds of pulled wool it may be compared with the annual yield in Great Britain of some 130,000,000 pounds, to which may be added 700,000,000 pounds imported into that comparitively small area each year. Of these combined quantities about 543,000,000 pounds are consumed in Britain, the remaining 316,000,000 pounds being exported. The wool industry of Great Britain is a definite one of first importance, commanding the attention of both the manufacturers and the grower wherever he may be situated. So well are the London wool sales organized that one can buy almost any quality desired from samples secured by mail or by personal examination of offerings. When sales are in progress the different lots are classified and catalogued. Buyers are allowed to examine the offerings in the forenoons from gashes made in the bales. In the afternoon when the sales are in progress purchases are intelligently made by reference to the catalogue marked in the morning. Rather than bother with Canadian wools, which are difficult to classify, some of our largest manufacturers purchase at the London sales the exact qualities required.

CHAFF, BURRS, ETC.

The presenec of foreign matter such as chaff, hay seeds, burrs, etc., in most Canadian wool detracts very largely from its value. Unfortunately our long Canadian winters, necessitating housing and the feeding of dry fodder, are responsible for much of the vegetable matter found in our wool. In addition, too many sheep raisers are not careful to clean their farms of burrs, with the result that the fleeces become badly infested with each recurring autumn.

The losses from the presence of vegetable matter are very large and assuredly come out of the wool grower. It is removable only by expensive machinery or a process known as carbonizing. In the process of combing most of the chaff, etc., is removed, but for carding carbonizing is frequently necessary. This process consists of treating in an acid bath and raising the temperature to about 220 degrees, holding it there for sufficient time to reduce all vegetable matter to dust, which is shaken out by a special process. According to some authorities carbonizing greatly weakens the wool and renders it harsh, while others claim that the fibre is only slightly damaged. At any rate the process is expensive and the wool grower pays the bill. The use of properly constructed racks, careful feeding, shearing on a clean surface and the protection of the sheep from burrs would go a long way toward increasing the value of Canadian wool.

COTTED WOOL.

Wool buyers and mill owners that purchase direct from growers and country storekeepers, complain of the presence of much cotted wool in each year's crop. One dealer estimates the amount at 6 per cent of the clip, while others place the proportion lower. This defect is most general in back country wool and is seldom found in lots from districts where the system of agriculture is well advanced. It is confined to the long-woolled breeds and grades of these, and is never seen in Down wool.

Cotting is believed to be due to several causes. Some sheep have a tendency to produce cotted wool; again neglect of proper shelter in bad weather, improper or insufficient feeding, extreme changes of temperature, ill health, second growth, etc., are all blamed for the cotting of wool. These conditions can practically all be guarded against in the breeding and care of the flock. Cotted wool is of very little value as it can be used in only the cheapest of goods.

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SECOND GROWTH.

A second growth of wool lessens the value of a fleece. It is due to late shearing. It is natural for the sheep to lose its wool each spring, and nature makes an effort in that direction. If shearing is delayed after the beginning of warm weather the fibres tend to separate at the body and a new growth commences which pushes its way up into the fleece. The presence of new short wool in a mature fleece is troublesome to the manufacturer, and, therefore, reduces its value. Shearing should, therefore, not be delayed after warm weather sets in.

TYING WITH BINDER TWINE.

With one accord dealers and manufacturers proclaim against the tying up of fleeces with binder twine. The following quotation from a reliable wool journal expresses the objection to this practice, which is not so common as it was a few years ago:—

'Again the growers of fleece wools are admonished not to tie wool with sisal or binder twine. Manufacturers and dealers are up in arms against this practice, and the manufacturer is more and more refusing to accept from the dealer wool tied with sisal or binder twine, and the time has come when the buyer of wool must discriminate against this kind of twine. In untying the fleeces, it is impossible to remove this kind of twine without leaving some of the fibres in the wool. This causes a defect in the goods when made, to the annoyance and loss of the manufacturer, who has to put such pieces of goods into his seconds. It leaves white or yellow streaks throughout the goods, as it will not take any dye. A farmer buying a piece of woollen goods, either black or coloured, would hardly accept a piece streaked with white or yellow. A farmer who insists on tying up his wool with binder twine will run the risk of having it rejected altogether, or be obliged to stand a reduction of several cents a pound. Wool should be tied with small, hard twine that will not rub off.'

Range Wools.

A wide difference of opinion prevails among manufacturers and dealers in regard to Canadian range wools. A number hold a rather poor opinion of them, while others find them quite satisfactory for the manufacture of the medium fine tweeds, flannels, fine blankets and underwear. After summing up the various opinions the writer concludes that these wools differ widely according to the character of the sheep from which they are shorn and the care given to them, especially during the winter and spring, as well as the grading and general care given the wool after it has been shorn. It appears to be perfectly true that much of our range wool lacks uniformity in quality according to the breeding of the bands. The original stocks were very largely Merino, but all the grading has been in the direction of mutton. The character of the wool, therefore, differs according to the number and breed of mutton crosses in the shorn sheep. A long wool cross produces a coarser wool than a Down cross, and so on from year to year and from cross to cross.

Again a great deal of complaint is expressed with regard to the strength of fleece as well as the presence of coarse fibres known as 'kemp' throughout the fleece. An investigation of this charge brought out the fact that the conditions complained of exist in the product of careless ranchers, while the wool raised on and shipped from well managed range flocks is not only uniform and strong in fibre, but almost or quite free from kemp. It is a well understood fact that if a sheep suffers from illness, shortage of food, or hardship of any kind producing an unthrifty condition, the wool ceases to grow during that period. It not only ceases to grow, but a weak place known as 'break' is produced at that point. The 'break' in range wool is believed to be caused by the periods of severe weather and shortage of feed experienced to a greater or less degree each winter or spring. The wool produced on ranges that provide food

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and shelter from storms and severe cold does not show that tenderness complained of by certain manufacturers.

That other defect 'kemp' is by many considered evidence of a more or less remote cross of a breed naturally prone to produce these stout hairs in the fleece. The old Mexican, as also the Welsh sheep, had this tendency. Again, exposure to severe weather causes an extra growth of stout hair, and in the case of sheep, to kill the fibre. While true kemp and dead hairs may not be strictly identical they are about equally objectionable and are present in a proportion of our range wool. The extra growth is a provision of nature to fortify an animal against suffering. This is strikingly exemplified in the case of horses and cattle, which when allowed to run out all winter produce long, coarse coats, whereas the same animals warmly housed remain sleek and smooth.

The presence of kemp greatly reduces the value of a fleece. The long stout hairs break readily and have another serious defect in not taking the dye well and, therefore, show up strongly in the manufactured fabrics. The precautions against kemp are practically the same as against 'break,' although it is advisable also to cull out such ewes as are noticed to produce kemp in their fleeces.

One of the features objected to by eastern mills and warehouses is their lack of proper grading. This prevents mills buying direct from growers, while dealers will pay only a low price for it in order to recoup themselves from loss on low grade lots. Better grading before shipment east would establish a confidence between grower and buyer that would increase the price at the range of these wools.

Certain ranches have established reputations for good wool, well put up, and the secret lies in the principles adopted in their management. Sheds are provided to protect the sheep during storms and a good supply of fodder is put up for winter feeding. These precautions insure continuous thrift of the bands and consequently healthy wool. Their methods of grading the wool are good. Each fleece is rolled up separately and each class kept by itself. These are: 1st, shearling; 2nd, ewes and wethers over one year old; and 3rd, rams. A fourth grade consists of taglocks, pickings and dead wool. Each grade is properly labelled and baled or put up in sacks. Firms who are known to produce good wool and handle it as described receive a higher price than the haphazard wool grower.

On account of the long haul it is important that the wool be put up in bales or in very substantial sacks. Either process is satisfactory, provided it is very carefully done. The bailing is usually done by a hay press or similar machine. The bales ranging in weight from 250 to 300 pounds, are bound with wire, and then covered with cheap sacking. Even though the sacks are torn during transportation the wool suffers no injury. Sacking is as satisfactory provided sufficiently strong material is used; a sack not less than 3¼ pounds will usually deliver the wool in good condition. The wool from the largest and best managed ranges is usually shipped in bales.

Pulled Wool.

In addition to the shorn wool, amounting to upwards of 12,000,000 pounds annually, there is also produced in Canada a large quantity of wool taken from pelts of slaughtered sheep and known as 'pulled' wool. The quantity from year to year usually exceeds 1,000,000 pounds washed, reaching 1,500,000 pounds in some years, the variation depending upon the export of pelts, which some seasons reach 250,000. These are pulled in the United States and thus swell our exports of wool to that country.

Throughout the Dominion there are about a dozen wool-pulling firms. These people buy the skins, wash or brush them, strip off the wool, which is sorted in the pulling into the several classes called for by the trade. The average weight of wool per hide is about three pounds washed, the quantity varying according to the breed of the sheep and the season at which it was slaughtered.

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Pulled wool is the most easily sorted, as the pullers quickly detect the different qualities which are thrown each by itself as follows: Lamb's extra, super, combing, low grade, called No. 1; and burr clipped. Each class is adaptable to a certain purpose, and varies in value accordingly. Most of the short wool 1 and 1½ to 3 inches taken from sheep and lambs slaughtered from June to October goes into the knitting trade for underwear and similar lines. Our finest underwear, however, is practically all manufactured from imported wools of the Merino class. Some of our largest knitting firms use fully 90 per cent of imported wools, while others making a heavier, coarser line of underwear and socks, use as high as 80 per cent of Canadian wool. It might be pointed out that Canadian made underwear bears an excellent reputation and is able to hold its own against even the finest imported lines. For this reason our knitting mills are doing a flourishing trade, whereas our cloth mills are not so prosperous. The longer grades go into the clothing and combing classes, respectively, similar to shorn wool.

A very common defect complained of by wool pullers is the presence of burrs. These have to be clipped out by hand at a cost of from 1 cent to 5 cents per hide before the pulling is commenced. Apart from the expense of the labour the wool is much injured, more especially if it be lamb's wool, which is of greatest value. In the opinion of the pullers the sheep raisers are not altogether to blame for this defect. It frequently happens that the damage is done after the sheep leave the farm. It is not uncommon for dealers and butchers to collect and hold sheep for days or weeks in pastures, not infrequently vacant lots, that are more than likely to be infested with burrs. It is here that many, but not all, of the burrs are gathered in the fleeces.

Shearing.

The date of shearing has much to do with the quality and condition of the fleece. Sheep not clipped until the weather is warm will rub off considerable wool, because they are too warm. They also collect much dirt of one sort or other. Sheep should be shorn while the weather is quite cool, cold some would call it. A better fleece is secured, the sheep do better afterwards as they do not suffer from the heat and ticks, and there is no wool to bother the lambs while sucking or to form deadly balls in their stomachs.

Sheep should be shorn on a clean, dry floor. The fleece should be carefully trimmed either before or after shearing. Stained locks or tags should be put in a separate pile to be properly cleansed before offering for sale. The fleece should be folded neatly, skin side out, and tied with sufficient twisted wool or 'wool twine' to hold it together. Afterwards it can be put into sacks or bales.

In shearing, the shears or clippers should be held close to the body and not allowed to run off at a tangent, cutting the staple into two or more pieces, thus seriously injuring much good wool.

The Outlook.

At the moment the wool man is having a dull time, but wool is the genuine article and will come into its own. It has always had its ups and downs, and like all other necessities, it will rise and fall in value according to the purchasing power of the people and the caprice of fashion. During the later part of the year 1907 and the early months of 1908 no class of woollen manufacturer has seen fit to stock up for the future. Even though the prices have been low purchasing has been done in a very conservative way, with the result that wool has been accumulating. The faithful sheep has been yielding as well as before, and at the same time the shoddy mills have by no means been idle.

The Canadian sheepman need have no fears for the future of the wool side of the business, provided he takes precautions to produce healthy, clean wool and gives

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attention to culling out the bad fleeced breeding stock. The conditions necessary to produce high class mutton are favourable to the growth of sound fleece. Canadian mills favour the Down wools, while the United States market takes care of the long wools, but each requires a sound staple as clean as possible from burrs, chaff, and other vegetable matter. Mutton will continue to be the chief aim of the Canadian sheep raiser, but the wool side is not to be despised and will increase the revenue from his flocks according to the condition of each season's clip.

'THE LAST OF THE FLOCK.'

(By Wordsworth.)

I

In distant countries have I been,
And yet I have not often seen
A healthy man, a man full grown,
Weep in the public roads alone.
But such a one, on English ground,
And in the broad highway, I met;
Along the broad highway he came,
His cheeks with tears were wet;
Sturdy he seemed, though he was sad;
And in his arms a lamb he had.

II

He saw me, and he turned aside,
As if he wished himself to hide;
And with his coat did then essay
To wipe those briny tears away.
I followed him, and said, 'My friend,
What ails you? Wherefore weep you so?'
—'Shame on me, Sir! This lusty lamb,
He makes my tears to flow.
To-day I fetched him from the rock;
He is the last of all my flock.

III

'When I was young, a single man,
And after youthful follies ran,
Though little given to care and thought,
Yet, so it was, an ewe I bought;
And other sheep from her I raised,
As healthy sheep as you might see;
And then I married, and was rich
As I could wish to be;
Of sheep I numbered a full score,
And every year increased my store.

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IV

'Year after year my stock it grew;
And from this one, this single ewe,
Full fifty comely sheep I raised,
As fine a flock as ever grazed!
Upon the Quantock Hills they fed;
They throve, and we at home did thrive;
This last lamb of all my store
Is all that is alive;
And now I care not if we die,
And perish all of poverty.

V

'Six children, Sir, had I to feed;
Hard labour in a time of need!
My pride was tamed, and in our grief
I of the parish asked relief.
They say I was a wealthy man;
My sheep upon the uplands fed
And it was fit that thence I took
Whereof to buy us bread.
"Do this: how can we give to you,"
They cried, "what to the poor is due?"

VI

'I sold a sheep, as they have said,
And bought my little children bread,
And they were healthy with their food;
For me,—it never did me good.
A woeful time it was for me,
To see the end of all my gains,
The pretty flock which I had reared
With all my care and pains,
To see it melt like snow away,
For me it was a woeful day.

VII

'Another still! and still another!
A little lamb and then its mother!
It was a vein that never stopped,—
Like blood-drops from my herd they dropped
Till thirty were not left alive,
They dwindled, dwindled, one by one;
And I may say, that many a time
I wished that all were gone,—
Reckless of what might come at last,
Were but the bitter struggle past.

VIII

'To wicked deeds I was inclined,
And wicked fancies crossed my mind;
And every man I chanced to see,
I thought he knew some ill of me;

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No peace, no comfort could I find,
No ease, within doors or without;
And crazily and wearily
I went my work about;
And of't was moved to flee from home,
And hide my head where wild beasts roam.

IX

'Sir! 'twas a precious flock to me,
As dear as my own children be;
For daily with my growing store
I loved my children more and more.
Alas! it was an evil time;
God cursed me in my sore distress;
I pray, yet every day I thought
I loved my children less;
And every week, and every day,
My flock it seemed to melt away.

X

'They dwindled, Sir, sad sight to see!
From ten to fivē, from five to three,
A lamb, a wether and a ewe;—
And then at last from three to two;
And, of my fifty, yesterday
I had but only one.
And here it lies upon my arm,
Alas! And I have none;
To-day I fetched it from the rock;
It is the last of all my flock.'

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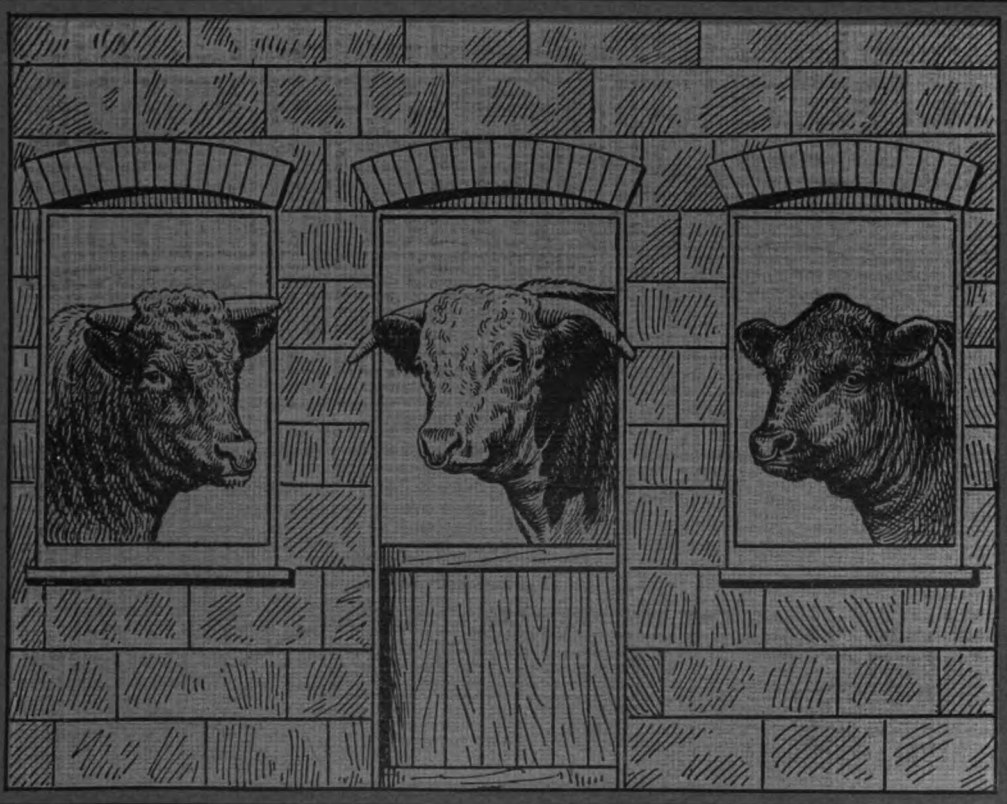
BEEF RAISING

IN CANADA.



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HONOURABLE SYDNEY A. FISHER

MINISTER OF AGRICULTURE, OTTAWA

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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
Branch of the Live Stock Commissioner

BEEF RAISING IN CANADA

COMPILED BY

J. B. SPENCER, B.S.A.

Bulletin No. 13

Published by direction of the Hon. SYDNEY A. FISHER, Minister of Agriculture, Ottawa, Ont.

APRIL 1, 1910

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OTTAWA, April 1, 1910.

To the Honourable
The Minister of Agriculture,
Ottawa.

SIR,—I have the honour to present the accompanying treatise on the Beef Industry of Canada. This bulletin, which has been compiled by Mr. J. B. Spencer, B.S.A. of this Branch, will, it is hoped, be the means of disseminating much useful knowledge with reference to the breeding, feeding and marketing of beef cattle.

In its preparation every effort has been made to secure the most accurate and reliable data regarding the industry.. The publication of this information, together with the views of experienced feeders, and, in many cases, descriptions of the methods which they have found most successful, should be of considerable value to all interested in the subject.

I herewith present the copy with the recommendation that it be published and printed for distribution as Bulletin No. 13, entitled, 'Beef Raising in Canada.'

I have the honour to be, sir,
Your obedient servant,

J. G. RUTHERFORD,
Live Stock Commissioner.

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In addition to the assistance afforded by those authorities whose names appear as the authors of articles or who are otherwise quoted in this bulletin, grateful acknowledgments are due a large number of breeders and feeders who supplied valued information in regard to their experience and practice. The sections on rearing and fattening are to a great extent compilations of answers to questions submitted to the following men:—

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Credit is also due the *Farmers' Advocate* and the *Scottish Farmer* for the use of photographs illustrating certain breeds of cattle.

THE LIVE STOCK COMMISSIONER.

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BEEF RAISING IN CANADA.

THE BEEF BULLOCK.

The destiny of the bullock is the block and after that the table. Between the cattle raiser and the table is the market and it is the demands of this that must guide the stockman in his effort to produce the most valuable bullock. There is another consideration not to be forgotten and that is the interests of the breeder and feeder. It is through the medium of the bullock that much of the farm crop is marketed so that much of his success as a marketing medium depends upon his thrift, or in other words, his ability to consume large quantities of food and to convert the maximum of this into a valuable marketable product. It is therefore necessary in the description of an ideal bullock to consider him from the standpoint of the breeder and feeder as well as from that of the butcher, who sets the value upon the animal from the sort of carcass it will yield.

In order to produce a high-class bullock the breeder must possess a mental ideal of his object and work towards that model. This is as necessary to the cattle breeder as to the builder of any structure. An architect must mentally see the finished building before he can draw his plans and order his materials. The wide-awake stockman who attends a series of well conducted judging schools or visits a modern fat stock show of any magnitude and there intelligently studies the forms of the prize winning animals, will have established a mental picture of a superior beef animal. It is for the cattlemen out of reach of such educational institutions as these that the following description is prepared.

In judging an animal one looks first at its general appearance or outline. What is wanted is as nearly as possible a block formation, having comparatively straight lines, along the top and bottom and up and down at the back. A short neck, short legs and a good length of body are to be looked for in the model beast. The animal is compact and broad of back from shoulder points to hips, has a wide deep body; short and somewhat thick neck, wide deep and full bosom; broad, thick, fleshy hind quarters and a generally deep wide body. Viewed from the side the top and bottom lines of the body run practically parallel with the back quite level. From front or rear the outline should be rather full and broad. A straight upper line, or level back indicates a uniform covering of flesh, which is all important to the butcher while a straight underline denotes a good depth of barrel and chest. The former indicates a good feeder and the later a vigorous constitution and these are both essential. The butcher likes a medium amount of bone leaning to fineness in proportion to the size of the animal. Coarse bone is always objectionable as it indicates a large proportion of bone to meat, and it is meat that the market wants. Smoothness of conformation, largely determined by fineness of bone, goes with a tendency to lay on flesh smoothly in all parts—especially in the valuable parts of the carcass. An animal must not become baggy, showing lumps and rolls of fat. What is wanted is that the fat and flesh to be laid on smoothly and thickly, especially on the more valuable parts such as the loin and rib.

The head is a fairly accurate indication of an animal's quality. A long coarse head with spiky horns is usually associated with lack of quality throughout. An animal with an extremely short, broad head is generally inclined to lack length of body. While the short thick type is a good feeder, the butcher prefers greater length. A correct head may be described as being somewhat short with the features fine and clean cut such as one sees in a handsome man.

The feeder likes to see a moderately broad muzzle with a good wide mouth and a large open nostril. The mouth indicates the strength of the digestive organs and the nostrils the lung power of the animal. An animal with a narrow muzzle, thin

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lips and close nostrils is generally a poor feeder and bad thriver. The distance from the muzzle to a point immediately between the eyes is preferably short, with some 'dish' just below the eyes which should be wide apart, large and bright but not wild or restless. A placid though bright eye indicates vigour of constitution and gentle temperament, while a nervous restless eye denotes unsatisfactory feeding qualities. A sunken eye lacking in lustre denotes a weak constitution.

The ear and the horn are both worthy of observation in judging a beef animal. A heavy, coarse, fleshy ear loosely attached to the head indicates a low degree of quality and of vigour and consequently of ability to appropriate profitably large quantities of food materials. The horn (in the horned classes) should be flat rather than round. Round spiky horns indicate coarseness throughout. While a good head is important it is so more particularly to the breeder and feeder because of what it indicates. It is the body back of the head that concerns the butcher and therefore the price he will pay for the animal.

The neck of the beef animal tends to be short, thick and muscular, of medium depth, and neatly attached to the body. The shorter the neck the better, not only because it is a cheap part of a carcass but more particularly because a compact neck indicates ruggedness of constitution and good feeding qualities. On the other hand undue length and scrawnyness of neck indicates a poor feeder and a narrow body. The neck should blend well with the body, uniting with it so smoothly that the point of union is scarcely perceptible. It is because a strong, thick neck is associated with a broad chest and a good lung capacity that it is so important. The shoulder should be smooth and in a fattened animal well and evenly covered. Over the top there should be good width but openness between the blades is to be avoided. The top should be full and round. While the shoulder is a cheap part of the carcass it is important that it be smoothly and compactly covered, not only because of itself but more particularly because it goes with thickness and quality of meat in the more valuable cuts farther back.

Coming below the neck we have the front of the animal including the breast and brisket. The more width in front of the shoulder, the better the rest of the body corresponds. This gives capacity to the heart and lungs—the vital organs on which vigour so much depends. Prominence of brisket adds to the appearance of an animal but for practical purposes it is sufficient if it is plump and of good width indicating a roomy chest behind. A flabby ponderous brisket is objectionable as it is of no commercial value or other advantage. The front legs should stand well apart as this goes with a broad chest floor. It is important that the front legs have a wide muscular attachment of arm at the shoulder with plenty of room from arm pit to arm pit below the chest. The shorter the leg the better and each should come straight down whether viewed from the side or front.

A large heart girth is desirable. This goes with full fore flanks and well filled crops indicating not only a roomy chest cavity but a good covering of flesh on top. It is along the spine on either side that the butcher gets the best cuts, and unless a fat animal has plenty of meat here, no matter how much he may weigh he cannot command a high price. Thickness and smoothness over the ribs along the back are essential to a high-class beef animal. Taking the barrel as a whole the greater thickness and smoothness the better and from a feeder's standpoint, the greater depth the better also. The butcher wants all the length of barrel he can get but the feeder knows that extreme length means weakness. The rib should be well sprung giving large capacity, but over paunchiness is not a desirable feature as it means waste to the butcher and does not necessarily stand for improved feeding quality. To be an easy 'keeper' a bullock should be closely ribbed up, that is the space between the back rib and the hook point should not be great. Then the body should come well down at the flank.

The loin provides the highest priced roasts and steaks and therefore should be massive and thick. It should rise slightly from the straight line of the back. A

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Fig. 1. Shorthorn Steer, "Roan Jim," an International champion, 1908.

Fig. 2. Aberdeen Angus Steer, Champion Ontario Winter Fair, 1908.

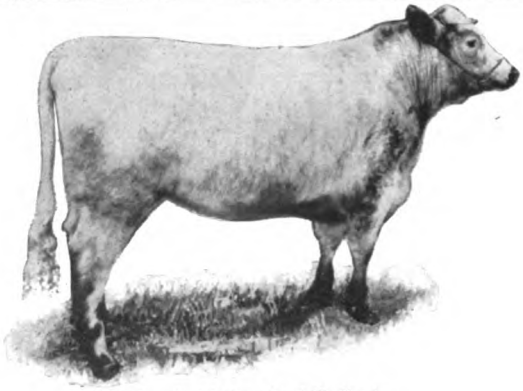

Fig. 3. A Choice Beef Bullock.

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sagging loin is decidedly objectionable for two principal reasons, first, that it denotes weakness and secondly that it lacks muscle. A low loin may be fairly thick but in such a case it is apt to consist largely of fat rather than lean meat.

In the early days of stock improvement wide hook points were highly esteemed but their uselessness from the butcher's standpoint has led to a modification of view regarding them. It is true they should be wide apart but not necessarily more so than the loin or sirloin. Consequently the feeder or breeder looks for the hook points rounded off smoothly, not standing up when finished, covered well and showing no signs of bareness. This will indicate a large proportion of flesh to bone.

The pin bones, situated at each side of the tail head should have fair width between, but prominence is not desirable. As a rule smoothness over the hook points goes with similar formation of these parts. Many animals have a tendency to develop patchiness at this point. In an old cow no serious objection can be taken to bunches of fat here but in a young animal it should not be overlooked as it is an indication of a tendency to form too much fat and is an evidence of lack of quality. The rump should be both long and broad; that is to say the distance from hook point to pin bone should be great, the width should be carried well back and be comparatively level. A droopy, peaked rump is a defective conformation, reduces the flesh capacity and detracts from the beauty of form. Viewed from behind, the quarters should be thick, showing a perpendicular line on the outside to where the thigh naturally narrows. On the inside the fullness should be carried well down. A split up appearance is decidedly objectionable. The thigh requires to be well packed on the inside and the flesh should be carried as near to the hock as possible. The expression 'Beef to the Heels' often heard among cattlemen is an extreme expression of what is admired at this point of a well finished beef animal of ideal conformation.

In the foregoing, reference has been repeatedly made to quality which is as important in a bullock as in a horse, a grade of wheat or a price of silk, if the best results are to be secured. The general appearance of an animal indicates its quality but a closer examination is also desirable. Quality is shown in bone, skin, hair, ears and horn. A coarse bone indicated by rough joints and heavy horns indicates lack of quality. Coarse, sluggish ears are not seen on a beast of fine parts. The hide is not only a safe guide as to the quality but it indicates the physical condition of the animal as regards thrift. The skin should be mellow and pliable, the hair abundant and silky. Taken in the hands the skin over the ribs should be mellow and pliable to the touch, easily grasped and stretched. A very thin hide or one that is thick, hard and boardlike are alike to be avoided in selecting a steer to feed or an animal to join the breeding herd.

THE FINISHED STEER.

A wise butter maker on being asked whether he considered it right to use butter colour answered that, if the market demanded Paris green in butter he would put it in. To succeed in the producing of butter or of beef the requirements of the purchaser must be complied with. The standard of the beef market has changed greatly in recent years. Not many years ago the best markets demanded large, heavy, thick bullocks, weighing 1,800 to 2,000 lbs., but that demand has changed and cattle of that description are no longer sent forward. The bullock that commands the highest price is a compact, well finished animal weighing not more than 1,500 lbs. on foot and if he weighs only 1,200 lbs. he will command the highest market price, provided he has the form, quality and finish. Even the thousand pound 'baby beef' is looked for by the man with the money on this side of the Atlantic, but such cattle are not shipped abroad. This change is greatly to the advantage of the producer, as other things being equal, the younger the animal goes to market, the less is the cost of food and the greater the profit to the producer. The British market demands cattle of moderate weights, good quality, and carrying sufficient fat in connection with the

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lean meat to secure a high degree of excellence without waste. To secure delicate flavour and tenderness a certain proportion of fat is necessary and this should be incorporated with the flesh or lean meat rather than appear only as a covering to the muscles. The great secret in producing a carcass of beef is to treat an animal in such a way that the fat grows with it during the entire period of its life time. It is unfortunately the too common practice of Canadian beef raisers to produce all the fat that an animal carries in the course of a few months. Much of the fat put on in this way is deposited on the outside of the carcass; it is largely wasted as it is useful for little else than tallow. The carcass that dresses out showing specks and streaks of fat throughout the lean tissue commands the highest price. Such beef is regarded as much of a delicacy as the finest turkey or lamb. The only way to be sure of prime quality is to maintain the animal in good condition by a system of liberal feeding from birth to maturity. Then the finishing period is comparatively short and the carcass produces the highly desirable marbled beef.

It will be gathered that the requirements of both the feeder and the butcher must be considered in the selection or breeding of the most profitable steer. The feeder must have in his animal good bone, roomy paunch and a deep broad chest, while to the butcher's steer these parts have no particular value because it is in these that much waste occurs. Giving the requirements of both feeder and butcher due consideration a standard of perfection has been built up in which each part of the animal is afforded a numerical value according to its importance. The following score-card agreed upon by many of the foremost demonstrators and instructors in animal husbandry will be of value to students who desire to become proficient in the judging of beef cattle.

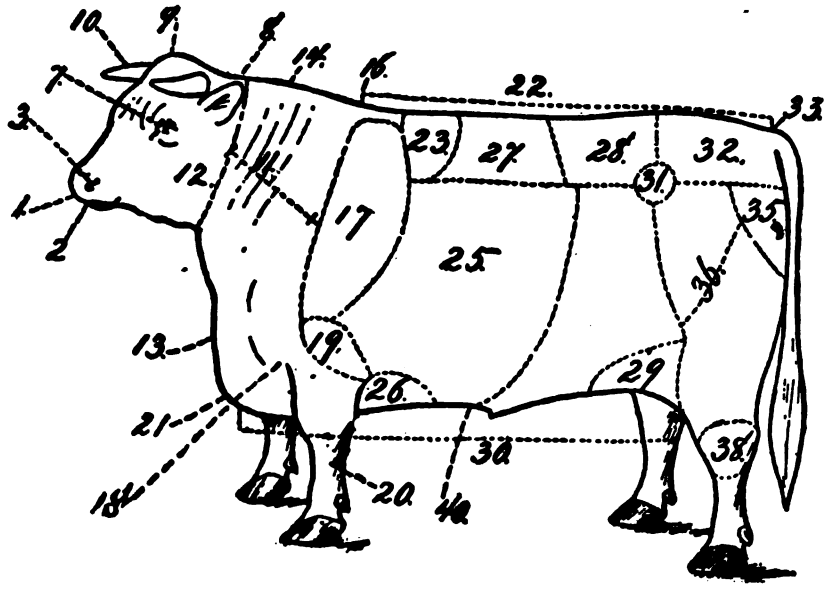

FIG. 4.—POINTS OF BEEF CATTLE. SIDE VIEW.

1. Muzzle.
2. Mouth.
3. Nostril.
7. Eye.
8. Ear.
9. Poll.
10. Horn.
11. Neck.
12. Throat.
14. Top of crest, or neck.
16. Top of shoulder.
17. Shoulder.
18. Point of shoulder.
19. Arm.
20. Shank.
21. Brisket.
22. Topline.
23. Crops.
25. Ribs, or barrel.
26. Foreflank.
27. Back or chine.
28. Loin.
29. Hind flank.
30. Underline, or bottom line.
31. Hip, point of hip, hook bone.
32. Rump.
33. Tailhead.
35. Buttocks.
36. Thigh.
38. Hock.
40. Navel.

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Score-card for Beef Steer.

General appearance:—40.

Weight, according to age	10
Form, straight top line and underline; deep, broad, low set, stylish	10
Quality, firm handling, hair fine, pliable skin, dense bone, evenly fleshed.	10
Condition, deep even covering of firm flesh, especially in the regions of valuable cuts	10

Head and Neck:—7.

Muzzle broad, mouth large, jaw wide, nostrils large	1
Eyes large, clear, placid	1
Face short, expression quiet	1
Forehead broad, full	1
Ears medium size, fine texture	1
Horns, fine texture, oval, medium size	1
Neck, thick, short, throat clean	1

Forequarters:—8.

Shoulder vein, full	2
Shoulders, covered with flesh, compact on top, smooth	2
Brisket advanced, breast wide	1
Dewlap, skin not too loose and drooping	1
Legs, straight, short; arm full, shank fine, smooth	2

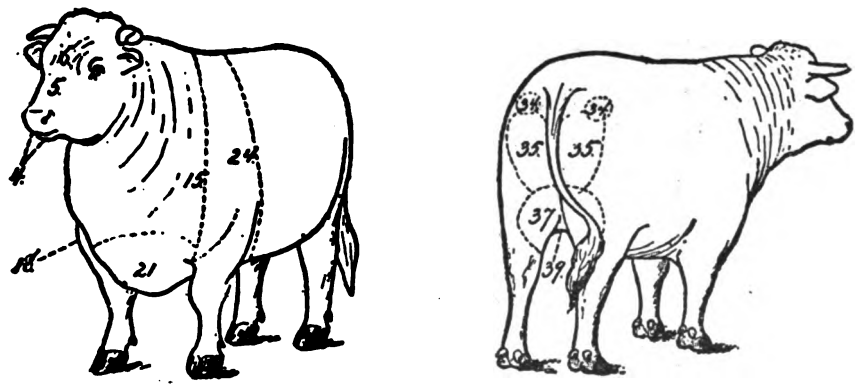

FIG. 5—POINTS OF BEEF CATTLE. FRONT AND REAR VIEWS.

4. Lips.
5. Face.
6. Forehead.
15. Neck vein, or shoulder vein.
18. Point of shoulder.
21. Brisket.
24. Girth.
34. Pin bones.
35. Buttocks.
37. Twist.
39. Purse.

Body:—32.

Chest, full, deep, wide, girth large, crops full	4
Ribs, long, arched, thickly fleshed	8
Back, broad, straight, smooth, even	10
Loin, thick, broad	8
Flank, full, even with underline	2

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Hindquarters:—13.

Hips, smoothly covered, distance apart in proportion with other parts	2
Rump, long, wide, even; tail head smooth, not patchy	2
Pin bones, not prominent, far apart	1
Thighs, full, deep, wide	2
Twist, deep, plump	2
Purse, full, indicating fleshiness	2
Legs, straight, short; shank fine, smooth	2
Total	100

COMMERCIAL CUTS OF A PRIME BULLOCK.

A prime bullock weighing about 1,400 pounds will dress out a carcass of about 800 pounds. The accompanying diagram shows the divisions of the carcass into the several cuts as understood by the trade. Cattle of a lower grade yield a smaller percentage of loin and rib than the diagram shows and these parts from such an animal also sell for a lower price per pound. The diagram shows about the retail selling price of the different cuts from a prime well-bred steer. The following paragraphs describe the location and use of each of the several cuts:—

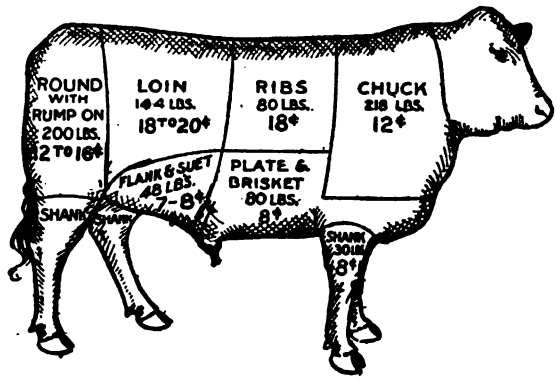
ROUND WITH RUMP ON 200 LBS. 12 TO 16¢
LOIN 104 LBS. 18 TO 20¢
RIBS 80 LBS. 18¢
CHUCK 218 LBS. 12¢
FLANK & SUET 45 LBS. 7-8¢
PLATE & BRISKET 80 LBS. 8¢
SHANK
SHANK
SHANK & SOUP 8¢

Fig. 6.—Diagram Showing Carcass Cuts.

Loin.—The loin of beef is subdivided into porterhouse or short cuts, T-bone and sirloin. The porterhouse consists of the first five or six steaks from the small end next to the ribs. Next to this comes the T-bone steaks, regarded by many as the very choicest part of the loin. The last six or eight steaks next to the round are known as the sirloin. The tenderloin is the inside portion of lean meat next the rib end of the loin. In some marakets the tenderloin is cut only from the cheaper carcases and the balance of the loin is used for canning in such cases. Where the tenderloin is cut from a choice carcass, a fancy price is charged for it, as it seriously injures the value of the remainder of the loin.

Round and rump.—The rump is the fleshy portion over the thigh. After it is cut off, the round extends on down to the shank, having only one bone near the centre.

Flank.—A section of lean meat overlies the flank which is stripped off and is known as the flank steak, and is much sought after. The balance of the flank is mostly used for sausage and hamburger, but can be boiled.

Ribs.—This section consists of the first seven ribs and is mostly used for roasts. The cuts nearest the loin are considered the choicest and sell for the most money. Next to the chuck the meat is deeper and rather coarser.

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Chuck.—The lower eight or ten inches of that portion marked chuck is known to the trade as the 'clod.' This lies just above the brisket and extends up to the lower portion of the neck. This is cut mostly for pot roasts and contains much lean meat. Most of the chuck is cut into steaks, the best portions being on the end nearest to the ribs. The portion next to the neck usually sells for pot roasts or boiling.

Plate.—The plate is the lower portion of the carcass below the ribs, taking in the covering of the belly. It is mostly used for boiling but contains some good meat.

Brisket.—This takes in the portion between the shank and the clod, or lower part of the chuck. It is a very fleshy piece with some heavy bone, but makes fine pot roasts or boiling meat.

Shank.—That portion of the shank from the knee or heel to the cut above, is fleshy, though coarse, and is mostly used for boiling. The lower part is mostly bone and sinew and is for soup and boiling. In the forelegs this is called the shin.

Neck.—This part usually sells with a part of the chuck and is fit mostly for boiling. It is fleshy but coarse.

Sirloin ends.—In some markets the ends of the sirloin and T-bone steaks, which run down into the flank, are cut off at the point where the flesh widens and are sold separately. These ends are coarser than the loin meat, but properly cooked are as good as any part of the animal.

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MODERN BREEDS OF BEEF CATTLE.

The rearing of cattle is closely associated with successful agriculture. In any farming country the standard of agriculture may be measured by the quality of cattle kept by its farmers. Not only does the character of the animals found in the barns reflect the field practice of the proprietor but the very presence of superior stock inspires advancement in all associated branches of the industry.

While cattle are employed even yet in parts of Canada, for labouring purposes the chief end of the bovine race is the production of food products. Whether belonging to the beef, the dairy or the combination class, excellence of quality is measured by the suitability of the animal for the purpose intended. Excellence, again, is dependent upon improvement at the hands of man. Unimproved or original cattle possessed a fair degree of vigour; they were slow to mature, yielded only light carcases of poor flesh, and the cows, like mammals of the forest, gave only sufficient milk to sustain their offsprings for a few months or until the young things were able to gather a livelihood from their own pickings. Even to-day in districts far behind in agriculture the cattle are little better than were the unimproved specimens found in Europe previous to their division into classes and breeds as they are found at the present day.

All of the improved breeds of cattle reared to any extent in Canada to-day come to us from Europe, and with the exception of the Holstein-Fresian, the Dutch Belted and the Brown Swiss practically all have been originated within the British Isles.

Until agriculture in Great Britain became organized into inclosed cultivated farms there was little or no improvement in the cattle stock of the country. With the advancement in field practice there came about more care in the selection, perpetuation and feeding of the cattle. Certain districts were favourable to special lines of development and in each district were found men who took a leading part in working toward what seemed to them most desirable. Occasionally importations of sires from other districts and foreign countries were made when such animals could be found as were believed to possess qualifications of a desirable sort. There was, however, comparatively little interchange of stock between different parts of the Kingdom which condition was favourable to the beginning of what later became distinct breeds. In the following pages a brief history of each of the leading breeds of cattle reared in Canada is given together with descriptions of characteristics and other information regarding each.

THE SHORTHORN.

By C. M. MacRae, B.S.A., Live Stock Branch.

This breed of cattle, now widely distributed over the face of the globe, is descended from the old Northeast of England breed, variously designated as the 'Durham,' 'Teeswater,' 'Yorkshire' or 'Holderness.' Some authorities think that the breed originated by mating the aboriginal cows of Ancient Northumbria with large bulls from Holland, or the Netherlands. This would account for the excellent milking qualities of the early Shorthorns, also their short horns, both being inherited from their Continental sires.

Even before their improvement by the Messrs. Colling, Bates, Booth and others, they were regarded by many as the best race of cattle in England and are described as having large, square frames, table backs, prominent hooks, deep milking qualities and an aptitude to fatten, although their flesh was somewhat coarse in texture and

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unevenly distributed. They had short horns, good handling qualities, and in colour were generally red, white or roan, or occasionally showing a yellowish tinge. It will thus be seen that the breed at this date possessed many of the dominant characteristics of modern Shorthorn, but they needed the guiding hand of the master breeder to overcome their defects and to intensify and perpetuate their inherent good qualities.

The first systematic improvement of the breed, of which we have any reliable record, was conducted by the Colling Brothers (Charles and Robert) during the last two decades of the 18th century; although it is well known that many herds of excellent cattle, carefully selected and well bred, existed prior to that time. Private records were kept by several owners and some of these date back two centuries.

About 1783, these brothers, after a careful study of the methods of breeding practised by that pioneer experimenter in this field, Robert Bakewell of Dishley Hall, Leicestershire, in improving Leicester sheep and Longhorn cattle, began laying the foundation of their Shorthorn herds, Robert Colling at 'Bampton' and Charles at 'Ketton,' illustrious names in Shorthorn history. On the former herd of seventeen select cows, the bull 'Hubback' was for a few years used with remarkable results. From this herd sprung such noted families as the 'Princesses,' 'Red Roses,' 'Bright Eyes,' 'Wildair,' etc., and among the great sires produced were: 'Punch,' 'Ben,' twin brother to 'Ben,' 'Colling's White Bull,' 'Marske,' 'North Star' and 'Phenomenon.' The 'Ketton' herd was founded on what was afterwards said to be four of the best cows in England, of which were 'Duchess,' the progenitor of that famous family so closely identified with the name of Thos. Bates, and Lady Maynard. From his brother, Charles got the bull 'Hubback' but sold him again after only two years' use. showing that neither of the brothers appreciated the worth of this bull, although it is undoubtedly to his influence that the first great improvement of the breed may be traced. Many Shorthorn pedigrees run back to the 'Ketton' herd, where such wonderful sires as 'Foljambe,' 'Favourite,' and 'Comet' were produced.

The Colling brothers were shrewd business men and early saw the advantage of bringing the merits of their cattle before the public. One of their advertisements was the selling of the 'Durham Ox' by 'Favourite' to John Day, who for six years exhibited him throughout England and Scotland. At ten years of age this ox weighed some 2,400 pounds. Later, Robert Colling's pure bred free Martin heifer, known as the 'White Heifer that Travelled,' weighing about 2,500 pounds was fitted and sent through the neighbouring counties.

The practice of hiring out bulls to breeders was another means adopted to advertise the breed. Finally, the high prices realized at the Collings' dispersion sales in 1810 and 1820 not only widely advertised the breed but greatly increased its popularity.

In-and-in breeding had been closely followed by the Collings with, as has been intimated, marvellous improvement to the breed, but the early dispersion of the 'Ketton' herd would indicate that the founder had grave misgivings as to the future under the continuance of such a policy. While the blood of these two herds was extensively used for the improvement of many other herds, two names stand out conspicuously, the Booths and Thos. Bates, founders of different types, regarding the respective merits of which, the most intense rivalry existed for half a century.

The Booths at 'Killerby' and 'Warlaby' struck off on an independent line to improve on the work of the Collings but largely used Collings' bulls. They aimed to produce a thick fleshed, easily fattened animal, without particular reference to milk production, or to that style so much emphasized by their rival Bates, who, on the other hand, insisted on beautiful form, stylish carriage, and good milking qualities.

Space forbids even a summary of the wonderful achievements of those master breeders; tribes and families were founded, sires of the most impressive prepotence were produced. The Booths with their 'Braclets,' 'Necklaces,' 'Mantilinis,' 'Blossoms,' 'Farewells,' 'Moss Roses,' and 'Lady Fragrants,' and the produce of such bulls

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as 'Pilot,' 'Crown Prince,' 'Windsor,' 'Commander in Chief,' and many others, added to the fame of their chosen type and won victory after victory at the agricultural exhibitions of their day.

Thos. Bates, at 'Kirklevington,' carried the concentration of blood lines to the farthest possible extreme. He insisted that Shorthorns, not possessing the blood of 'Hubback' were unworthy of record in the Herd Book. Crossed and doubled-crossed the blood of 'Favourite' made a crowning hit in the production of the great bull 'Duke of Northumberland' and established many noble families, prominent among which were the 'Duchesses,' 'Oxfords,' 'Waterloos,' 'Wild Eyes,' etc., etc. Around the former of these tribes centered the wildest speculation excitement in the records of animal husbandry, culminating in 1873, when at the famous New York sale, the '8th Duchess of Geneva' brought at auction $40,600, the highest price ever paid for a any single animal of the cattle species. Fads in breeding had been carried too far, pedigree alone was of value, animals of the desired blood lines were retained on breeding herds irrespective of individual merit and disaster was not long in overtaking the mad speculative craze that took possession of Shorthorn breeders in America as well as in England.

Early in the past century the merits of the Shorthorn began to be appreciated in Scotland. Scottish breeders, however, aimed chiefly at the production of a class of cattle capable of turning grass and turnips into beef at a profit, and in their anxiety to do this they sacrificed, to some extent, the size and also the milking qualities of the breed, though not to such an extent as was done later in America. Prominent among the early breeders stand the names of Robertson, Rennie, Barclay and Grant Duff, but better known than any of these are the names of Amos Cruickshank of Sittyton, and his brother Anthony. To Amos belongs the credit of breeding up and fixing the type of the popular Scottish Shorthorn of to-day.

Cruickshank adhered to a fixed purpose all through his life, viz.:—to produce a race of early maturing, sappy animals, that would pay the rent. His ideal was a low-set, stout-middled, thick-fleshed animal, with strong constitution and good feeding qualities. From 1837 to 1860 he bought wherever he found what came near his ideal regardless of price. He visited the chief herds on both sides of the border and attended the principal sales, always in search of individuals to improve his cattle. He was indifferent to fashionable pedigrees, caring more for good individuality especially in the bulls purchased to head his herd. In 1858, Wilkinson of Lenton, a noted breeder, offered him 'Lancaster Comet,' then in his eighth year. This bull had proved a good sire, but when Amos Cruickshank saw his great head and horns over the side of the railway truck, he was so disappointed that he sent 'The Highland Bull,' as one of his neighbours called him, to the Clyne Farm to be out of sight. There in 1859 this bull served a dozen cows that had failed to breed the year before. Being left out late that fall, he contracted rheumatism and was sent to the shambles. One of his calves 'Champion of England' became the greatest stock bull ever owned in Scotland, and his progeny were afterwards bred incestuously to fix the type, and it was building upon a 'Champion of England' foundation that the Sittyton herd reached that state of perfection which made it famous. Shortly after this date Cruickshank gave up testing outside bulls, and used only home bred ones until 1899 when he dispersed the whole herd, which, at times, had numbered three hundred cattle. No doubt the main reason for selling out lay in the fact that he, like Bates, had inbred to such an extent that an outcross had become necessary. Outside bulls had in the past proved unsatisfactory so, rather than take the risk of impairing the excellence and reputation of his cattle, he dispersed his herd and retired. At this sale the largest purchasers were Duthie, Willis, and the late William Marr, though animals went to many other buyers, both in the Kingdom and the Americas. These men are still recognized as foremost breeders of the Cruickshank type of cattle amongst a host of others scattered over the face of the globe.

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Fig. 7. Shorthorn Bull, aged 3 years and 2 months, "Chiddingstone Malcolm,"

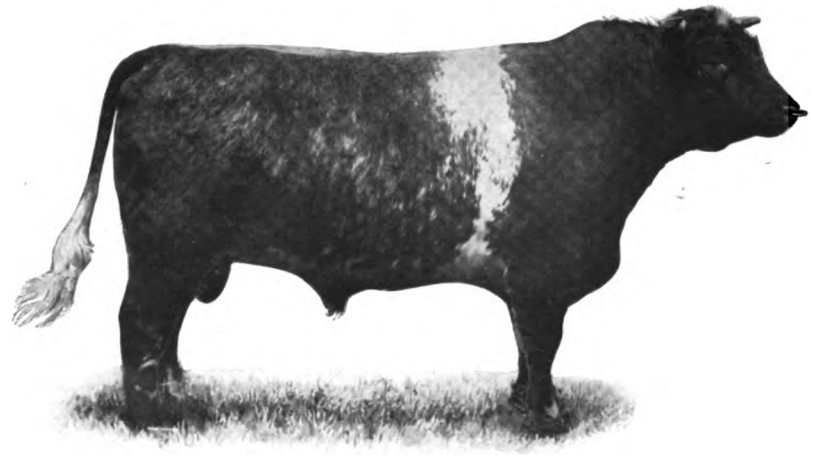

Fig. 8. "Topsman's Duke," a famous sire, bred, reared and used in Manitoba.

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Fig. 9. "Marchioness," a Champion Shorthorn at Winnipeg Exhibition.

Fig. 10. Shorthorn Cow "Sweetheart," a Champion at the Royal Show of England.

Fig. 11. Shorthorns on a Saskatchewan Stock Farm.

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Fig. 12. Champion Aberdeen-Angus Heifer at British shows.

Fig. 13. A group of Angus Heifers reared in Saskatchewan.

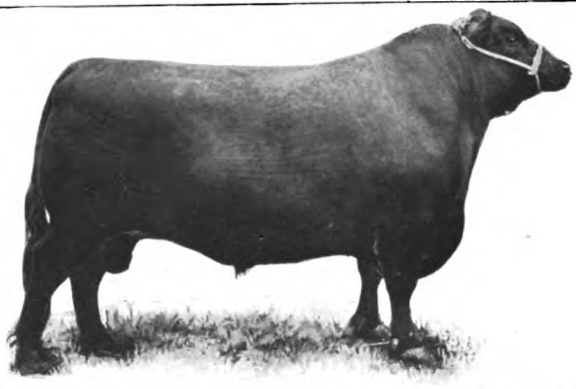

Fig. 14. Aberdeen-Angus Bull "Wizard of Marsmore," a Scottish Champion.

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Fig. 15. Hereford Heifer, "Ashleaf III."

Fig. 16. Hereford Bull "Happy Christmas," head of a Manitoba herd.

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When the leading and prominent breeders follow one particular line of breeding, or a certain type becomes fashionable, the rank and file are sure to fall into line. In these latter days the 'Scots' type has almost become a fad; size, style, and milking qualities have to some extent been lost. It is, however, a fact worthy of note that some of the prominent breeders of Great Britain are introducing Bates' blood as a top cross on the Scots in order to revive these most valuable qualities, and some such course seems absolutely essential if this noble breed is to hold its own as the 'farmers' cow.'

Characteristics.

The Shorthorn is unquestionably the most popular breed of cattle in the world to-day, as well as the most cosmopolitan. They are hardy and thrifty, have size, without coarseness, are kindly and docile, readily taking on flesh, which is of good quality and distributed evenly and smoothly on the most valuable parts of the carcass. They mature early, are fairly good grazers and make excellent feeders, standing even long periods of forced feeding well. They cross well with other pure breeds and are unexcelled for improving common cattle, imparting size, quality and early maturity, improving the fattening properties, and frequently the milking qualities.

Like other breeds they have defects. In some strains, families and herds, are animals of impaired constitution and tendencies towards sterility, resulting from too close breeding, highly artificial treatment, accompanied with poorly ventilated housing and excessive show yard fitting.

Not only is the Shorthorn a beef producing animal holding its own with the most highly developed special purpose beef breeds, but many families possess the double characteristic of being deep milkers also. They are undoubtedly the best milkers of the beef breeds and are frequently spoken off as a dual or general purpose breed. Away back in the early days of the breed's history they were known as good milkers. In 1810, Chas. Colling reserved from his dispersion sale the cow 'Magdalena' by 'Comet' which, as a milker, would be eligible for a place among record breakers. She gave 32 quarts a day on ordinary feed. That this important trait has not been entirely lost, the following statistics gathered from reliable sources are quoted to show what this popular and useful breed can do as milk and butter producers:—

Pure Bred Shorthorns.	Age	Milk.	Butter.	Owner.
		Lbs.	Lbs.	
Darlington Lass	9	9,657	436·5	C. E. F., Ottawa.
Campbell	6	9,603	418·	Wis. Exp. Stn.
Miss Molly	12	7,430	412·3	C. E. F., Ottawa.
College Moore	....	8,734	409·	Iowa Exp. Stn.
Marchioness	8	8,488	404·4	C. E. F., Ottawa
America	6	8,066	403·3	Utah Exp. Stn.
College Belle 2nd	...	7,554	355·	Iowa " "
Maggie Hughes	5	5,840	401·	Utah " "
Jane	10	7,683	346·	Wis. " "
Mary Clay	9	5,774	325·	Utah " "
Rose of Glenside	8	18,075	624·76	May & Ottis, Penn.
Average for 11 cows	....	9,736	410·3	

As will be noted the above records were made in Canada and the United States. Other authentic records of high producing Shorthorn cows are shown farther on in this bulletin in an article on the establishing of a commercial herd of general purpose cows.

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The Breed in Canada.

Shorthorn cattle were imported to this continent before the end of the eighteenth century, but it was not until 1825 that they were brought into Canada. About that year four bulls were imported into New Brunswick by the Board of Agriculture of that province. Judge Robert Arnold, of St. Catherines, Ont., was actually the first breeder of Shorthorns in Canada. In 1832 he purchased from Chas. Henry Hall, of Harlem, New York, the cow 'Countess—782.' From her he reared ten calves, including 'Leopold—761' and 'Wellington—1154,' which became famous sires. The descendants of this cow are widely scattered over this continent. In the same year (1832), Mr. G. W. Smith, of St. Thomas, Ont., imported a cow and a bull from England, but soon disposed of them to breeders. The following year (1833), six heifers and a bull were brought out by Roland Wingfield, an Englishman, who soon afterwards sold them to John Howitt of Guelph. This lot included 'Lily—302,' and 'Pedigree—408,' which yielded several heifers to whom many Canadian Shorthorns trace. From that time forward importation increased year by year. Robert Wade of Coburg, Hon. Adam Fergusson of Woodhill, F. Boyd of Young street, Toronto, Messrs. Geo. and John Simpson of Newmarket, Col. Burrows of Brantford, Wm. Ashton of Galt, Ralph Wade, Sr., of Port Hope and a number of others had all made importations prior to 1850. Soon after that date importing on a large scale was commenced. Wm. Ashton of Galt, brought out a large shipment in 1854, which year Geo. Miller of Markham, Wm. Miller of Claremont and F. W. Stone of Guelph, commenced to import Shorthorns. Among the animals brought out at that time were the celebrated bull 'John O'Gaunt 2nd—140,' 'Beauty—30,' 'Lady Jane—281,' 'Lily—302,' 'Louisa—304,' 'Miss Syme—369,' 'Young Snowdrop—564,' 'Red Rose—455,' 'Roan Duchess—460' and many others whose names appear in the pedigrees of prominent herds of the present day.

According to the records there had been imported into Canada previous to 1860 upwards of 160 head. While a large number of these animals and their pure bred descendants were sold to go to the United States, it is safe to infer that up to that date, a half a century ago, there were many thousands of pure bred Shorthorn cattle in Canada. It is not to be wondered at that the Red, White and Roan at the present time fills so large a place in the beef cattle industry of the Dominion. The breeding and importing of Shorthorns had in the sixties become a well established industry.

To the ranks of men already financially interested in the business are being added recruits almost every year. Among outstanding importers of the last quarter of the past century were Simon Beattie, Markham, Ont.; H. M. Cochrane, Hillhurst, Que.; James I. Davidson, Balsam, Ont.; Hon. David Christie, Paris, Ont.; Hon. George Brown, Brantford, Ont., and John Miller, Broughton, Ont. While much distinction came to the breed through the enterprise of each of these men, the names of Cochrane and Davidson stand out, the former because of the prominence given the Duchess family, and the latter the Cruickshank strain and type.

Pedigree Registration.

Pedigree registration for Shorthorns commenced about 1820. The first volume of the English Shorthorn Herd Book was published in 1822 by George Coats of Carleton, Yorkshire, England. Four years later five volumes had been published. In 1846 the first volume of the American Shorthorn Herd Book appeared. It was published by Lewis F. Allen of Buffalo, New York. Other United States Herd Books sprang up but all were purchased by the American Shorthorn Association in 1882. Up to the end of 1908, seventy-three volumes of the American Shorthorn Herd Book had been completed, containing the pedigrees of 307,000 bulls and 467,895 cows and heifers.

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Registration was commenced in Canada about 1854, but, it was not until 1867 that a Herd Book was printed. This Book, known as the Canadian Herd Book, admitted the pedigrees of females having four and males having five registered top crosses. In 1881 the British American Shorthorn Association was organized. By this body the rules of entry were changed, admitting for registration only such animals as traced directly to stock imported from Great Britain A few years later the Dominion Shorthorn Breeders' Association absorbed the two former Herd Books, and in 1887 the first volume of the Dominion Shorthorn Herd Book appeared. Up to December, 1909, twenty-six volumes containing the pedigrees of 77,670 males and 89,882 females had been issued.

THE ABERDEEN ANGUS.

Aberdeen Angus cattle, as found in herds scattered over the beef raising countries, occupy a prominent place among the beef producing breeds of the world. Although descended from dairy stock of no mean quality its milking powers have been rather neglected while meat production has been made the first object of the adherents of the breed. It is therefore not astonishing that the Aberdeen-Angus breed has fought its way in recent years to many championships in fat stock show rings on both sides of the International boundary and of the Atlantic.

While the breed possesses a comparatively long and honourable history, it is within a space of less than forty years that the native cattle of Angus and Aberdeen have spread to distant continents, where they now command the esteem of ranchmen and farmers. On the ranches of Canada and the United States, as well as the estancias of Argentina, the veldts of South Africa, and the grazing areas of Australia and New Zealand, there may to-day be found feeding and echoing back to its native land fresh laurels as their merits become known.

The history of the improvement of the breed which extended over the greater part of the nineteenth century may be regarded as really that of the breed, for it was in the course of its improvement that the breed acquired distinctness and fixity, chiefly in the hands of a few eminently skilful men.

Historians of the breed place the name of Hugh Watson of Keillor in the front rank of improvers of the polled cattle of Forfarshire and Aberdeenshire. Mr. Watson, born in 1789, commenced farming on his own account at Keillor in 1898 with half a dozen of the best and blackest cows and a bull from his father's stock. In the same year he added to his herd ten heifers of various colours and a black bull named 'Tarnty Jock,' the first 'Jock' of the Keillor herd. With this stock the foundation of his herd was well and truly laid. Two years later Mr. Watson commenced exhibiting his cattle and other stock at the leading shows, and during his lifetime he is credited with winning for various kinds of stock in England, Ireland, Scotland and France upwards of 500 premiums. In 1829 he competed at the Highland Society Show and the Smithfield Club Show, after which the results of the block test added greatly to the rising fame of the breed.

The sire which was accounted to have exerted the greatest influence in his herd was 'Old Jock,' registered as No. 1 in the Herd Book, fourth in the direct male line descended from 'Tarney Jock,' already referred to and described by his breeder's son, as in his breeder's opinion, the best bull he had ever bred, a grand grazing animal, of iron constitution, and superlative quality. As a yearling in 1843 he won first honours of the Highland Society, and again in 1846, and at ten years of age the Sweepstakes award.

Of the female polls at Keillor, 'The Prince Cow,' registered as 'Old Grannie No. 1,' was distinguished on account of her longevity, fecundity, and excellence as a breeder. She died of old age in the middle of her 36th year after yielding 25 calves. Her last son 'Hugh—130' calved in her 29th year, proved a famous sire in the herd

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of Thomas Ferguson of Kinochtry. A four-year-old ox, son of 'Old Grannie,' won the Purcell Challenge Cup at Belfast, and afterwards, becoming the property of the Prince Consort, was put to the plough at Windsor, where he died when past the age of seventeen years.

Contemporary with Mr. Watson was Mr. Bowie, Mains of Kelly, who established a herd of Angus polls within a year or two of the founding of the Keillor herd. This herd, continued by Mr. Bowie's son, stands out in the history of the breed as the source of some of the most influential sires in other distinguished herds, including those of the Earl of Southesk, at Kinnaird Castle, and Mr. Wm. M'Combie of Tillyfour in Aberdeenshire.

The breed made very substantial progress in Scotland until 1859 and succeeding years, when some of the most famous herds of the day were wiped out, or greatly weakened, by outbreaks of Foot and Mouth disease and Pleuro Pneumonia. While these serious circumstances set the breed back its merits have become sufficiently recognized to insure its ultimate success. It is impossible to give more than a very few names of men who were prominently associated with the history of the breed. Messrs. Mustard, Ruxton, Ferguson of Kinochtry, Scott of Balwyllo, Aylmer, Pierson, Lyall, Arch'd. White of Scott, Col. Delgairns and others have all contributed their well directed energies in the history of progress of the Angus. Then there was Robert Walker of Portlethen, Wm. Fullerton and others in whose herds famous bulls came to light. In Mr. Walker's herd, founded in 1818, there was bred the celebrated 'Fox Mule—305.' The building of Mr. Walker's stock was assisted by 'Banks of Dee—12,' 'Andrew—8,' calved in 1847, the sire of 'Young Andrew—9,' one of whose sons, 'Raglan of Portlethen—208,' took 3rd honours at the great Paris Show in 1856; where the second prize was adjudged to 'Marquis—212,' bred by Hugh Watson; the 1st prize to M'Combie's 'Hauton—228' bred by Alex. Bowie,' and described by Mr. M'Combie as one of the fortunes of his herd. Historians of the breed refer to many other worthy breeders among whom was George Brown of Westertown, Fochabarr, who gave distinct evidence of a power if not indeed amounting to that of a genius. He carried a mental type to which he worked towards an ideal. Unfortunately, when he had built up a grand herd, famous for its show ring victories, it was by an outbreak of Pleuro Pneumonia reduced to seven head, with which he again set to work and raised up a second herd quite equal to the first that was dispersed in 1874, the year of his death.

A history of the Aberdeen-Angus breed, however brief, would be very incomplete unless it contained some reference to the work of Mr. M'Combie. After being a few years associated with his father's great business in the cattle trade he, in 1830, founded an Angus herd that had a brilliant career until dispersed in 1880, a few months after his death. Mr. M'Combie was a strong believer in pedigree, particularly emphasizing the ancestry of a bull. He did not depend upon the breeding of a bull even though he was a good individual. Before being generally used on the herd he had to prove himself a thoroughly good sire. In no case would this famous breeder part with a satisfactory sire until he had finished with him. He possessed clear opinions how far it was advantageous to resort to in-and-in breeding of which he wrote 'it may be pursued for a time, but continued to a great length is against nature.' Theoretically he thought that by prolonged in-breeding good quality was maintained or improved, but size was reduced and constitution enfeebled. Mr. M'Combie gained most distinguished honours at the great French Show at Paris in 1856 and 1878, at Poissy in 1857, and at Paris Fat Stock Show in 1862. His champion groups of 1856 and 1878 especially showed superlative excellence.

It was in 1842 that the collection of pedigrees of Aberdeen-Angus cattle was commenced. Nine years later a disastrous fire wiped out the whole of the collected materials. In 1857 the work was again taken up and volume 1 made its appearance in 1862. The demand for the volume was small, only 44 copies being subscribed for. It was ten years before the second volume came out, then came volumes three, four

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and five, in 1875, 1877 and 1879, respectivly. Then came the organization of the Polled Cattle Society, who commenced a new series of the Herd Book, which was published as Vol. 1, new series in 1881. The book commences with 'Old Jock' of the bulls and 'Old Grannie' of the cows, both numbered 1, and bred by Hugh Watson of Keillor.

From the organization of the association the interests of the breed advanced rapidly, until in Volume No. 32, published by the Polled Cattle Society of Scotland, in 1907, there are registered 1,162 bulls and 1,674 cows and heifers, bringing the total bulls up to 27,662 and of cows and heifers up to 43,173. Simultaneously pedigree registration had been going on in this continent. The American Aberdeen-Angus Breeders' Association in 1886 issued Volume 1, containing 5,200 entries. This association up to March, 1909, had issued 18 volumes of the Herd Book containing the pedigrees of 124,500 animals.

Aberdeen-Angus cattle were first recorded in Canada in 1882 by the late Henry Wade, secretary of the Ontario Live Stock Associations at that time. Registration went on without interruption for two years when all pedigrees and other manuscript prepared for publication were destroyed by fire. Following this disaster many Canadian breeders cast in their lot with the American Association, others continuing to record at Toronto. In 1906 the present Canadian Aberdeen-Angus Association was incorporated under Dominion Act. The rules of entry were made to correspond with those of the American Association, with the additional requirement that all living animals not recorded in the American Record be inspected. The work of inspection was carried out in 1906 and 1907 by Mr. James Bowman of Guelph, Ont., who was nominated by the Canadian Association. The cost of inspection was defrayed by the Federal Department of Agriculture. The first volume of the Herd Book, containing the pedigrees of 2,693 animals, was closed early in 1908. Up to the end of 1909, 1,118 additional pedigrees had been recorded.

The Breed on this Continent.

Comparatively few Angus herds had been established outside of Scotland prior to 1870, but ten years later the breed was to be found in large numbers not only in England and Ireland but also in Canada, Australia, the United States, and a number of European countries. To Professor Brown, President of the Ontario Agricultural College, is credited the first importation of the breed to this continent. That was in 1876, when a bull and two females were added to the farm stock of the College. The records of Prof. Brown's experiments show that the Angus held its own well as compared with Shorthorns, Herefords and Devons in the important respects of feeding, milking, and early maturity. Soon afterwards herds were established by Mr. Whinfield of Quebec, Hon. J. H. Pope, M. H. Cochrane of Hillhurst, John Gray of London, Mossom Boyd of Bobcaygeon, and other well known Canadian breeders. At this time the breed was making even greater strides in the United States, where there are at the present time probably a thousand breeders of the Doddies.

In Canada the breed is spread from Prince Edward Island to British Columbia. One of the best herds of the day is to be found in the 'Garden of the Gulf'; and there are many fine herds in Ontario. In the west one herd consists of upwards of five hundred head, and there are many herds in Manitoba, Saskatchewan and Alberta, ranging from 20 to 40 animals.

Characteristics.

The Aberdeen-Angus is almost wholly black. Other colours, including brown, red and white markings, which were common in the early years of the breed's history, have become rare. The head, comparatively small in proportion to the size of the body, is hornless, and has the tapering top somewhat of sugar loaf form as seen from the front—characteristic of the polled breeds. The head across the eyes is broad while

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the lower part of the face is of medium length, with features terminating in a comparatively broad muzzle and flanged with widely expanded nostrils. The whole facial expression is refined and full of character, indicative of careful breeding. The ears, which are alertly carried, are of fully medium size and well clothed with hair. The general contour of the body is fittingly described by Wm. Housman in 'Cattle Breeds and Management' in the following language:—

'In harmony with the refined moulding of the cow's head and face, is the elegance, scarcely absolute lightness, but rather neatness, of the throat and fore-part of the neck of the high-class cow. The head is indeed very prettily set on, and between the thick beefy part of the neck next the body, and the head the tapering throat enhances the gracefulness of the animal's style. In the bull, the muscle of the neck, big and rounded, rising from the shoulder gradually to the top of the arch, whence the outline descends to the head, gives a stout masculine character. The female, according to her posture, has the line of the neck more or less nearly horizontal from the shoulder-top to the head, which is sometimes carried stylishly high as she walks, but more commonly at ease neither elevated nor drooping. On the whole, there is much of that which is aptly enough termed smartness or gaiety, in the character and carriage of the breed, without any excess of it in the direction of undesirable restlessness; neither is it enhanced by height. The body indeed is deep, but the legs fine in bone, being also short, do not raise it high from the ground, and the fully proportionate length of frame, and the roundness of the rib, reduce the effect of the depth of side. The animal consequently looks smaller than its weight proves it to be. The shoulders and hips, in the best representative specimens of the breed, are snugly laid in and covered, the crops and loin thickly packed with solid flesh, which is continued over the hind quarters, but not so thick as in some other breeds. It is not that there is a want of muscular furnishing from the hip to the tail, but that the flesh on the hind quarters is so free from superfluous fat as to slope off smooth and rounded into the thick and heavy thigh without break or distinguishing line. The body, therefore, perhaps as nearly approaches to the form of the proverbial gun-barrel as that of any other breed. The deeply covered neck-vein, the thick leaf of flesh under the floor of the chest, extending between the fore-legs to the brisket, and the ample substance of flank, twist and thigh, also show the generous tendency to make flesh on every part of the frame which has no bone in its structure.'

In fat stock show competitions the Aberdeen-Angus has maintained a prominent place in both live classes and block tests. Year after year it has had to be reckoned with in international and national championships, which have frequently been won by the pure bred or the grade Doddie. This has been true not only at the shows of Great Britain, but also at the Chicago International and Canadian Winter Fairs.

THE HEREFORD.

The Hereford, like the Devon, each named from the shire in which it was originally found, was evolved from the native cattle of the south and west of England. These cattle were generally dark-red or brown in colour and like the Devons of to-day active and sprightly in appearance. The present colour markings of the breed are attributed by some to Lord Scudmore's importation from Flanders prior to 1671. Others claim it was due to a white faced bull, brought down from the Tees Valley or Shorthorn country in 1760 by Wm. Galliers. It is probable that this bull besides imparting his own markings to his progeny, also helped to increase the size of the cattle.

Herefordshire, being fertile and well watered, has rich nutritious pastures which would account to some extent for the increase in size of the breed. Early in the 18th century the Hereford cattle were esteemed as superior oxen for draught purposes. They worked well till even fifteen years old and then fattened. They also had acquired the tendency to fatten readily and were quickly picked up by graziers who took them

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nearer to London and other cities where they were finished for the block. Marshall, writing of the breed in 1788 says: 'I have seen three year old heifers of this breed very fleshy, much fatter than any heifers of that age of any other breed, the spayed heifers of Norfolk excepted.'

The first breeder of note to undertake the improvement of these cattle was Benj. Tomkins, Jr., who commenced in 1770 and continued till 1812. Benjamin Tomkins, Sr., Tully, Knight Skyrme and Galliers were also prominent among the early improvers of the breed but to Benjamin Tomkins, Jr., really belongs the credit of bringing their merits before the public.

Following Tomkins and using his stock as a foundation to build upon, came John Price of Ryall. He at first attempted to increase the size of his cattle by using larger sires from the herd of Mr. Walker. The cross, however, proved unsatisfactory and having disposed of all the animals so bred he returned to the pure Tomkins strain. Mr. Price continued to breed Herefords till 1841, so that for seventy years the Tomkins cattle were bred continuously without the introduction of outside blood.

Both Tomkins and Price, like the improvers of other breeds at that period, followed a system of very close in-breeding. This system reduced the size of their cattle but produced animals of superior quality, smooth in outline, fine in bone, and comparatively easy to fatten. As a natural consequence too, of the intensification of blood lines, their progeny became very prepotent. Neither men paid any attention to colour. Tomkins had three well marked colours in his herd. The Pigeons were either gray or roan, the Mottles were so called from their mottled faces while the Silvers were red with white markings, much like those of to-day. One of his favourites, 'Silver Bull—41' was of this later strain but he considered his others equally good. The present uniformity of colour and markings are largely due to the efforts of Jno. Hewer, one of Price's contemporaries. It is doubtful if he would have been successful but that his rival's cattle were sold to go out of the country while his own were kept at home. His practice of hiring out bulls also had much to do with the final predominence of his favourite colour, red with white markings, as we have it to-day. He did much also to improve the size of his cattle. His aim was to produce large animals with as much scale as possible. One of his bulls, 'The General' weighed, when full grown, 3,640 pounds.

Unlike the Shorthorn families that are named from the dam, the great families of Herefords are named after the sires. This does away with so many small families The three principal ones are the Lord Wiltons, Anxieties and Grove 3rds.

'Lord Wilton' (4740), was bred by Wm. Tudge of Adfordton in the year 1873. His sire was 'Sir Roger,' dam 'Lady Claire' and he had the blood of the great bulls, 'Sir Benjamin' and 'Carbonel' twice over combined in his veins. This bull proved a phenomenal sire in different herds. 'Anxiety' (5188) was calved in 1876, the property of T. J. Carwardine of Stoctonbury. His sire was 'Longhorns' (4711) and his dam the celebrated prize cow 'Helena.' This bull was afterwards brought to Chicago, U.S.A., where he sired among others 'Anxiety 4th.' The Anxiety family came from one of the best bred herds in England. Between the years 1873 and 1883 Carwardine cattle won more prizes than any other herd in the land. 'Grove 3rd' (5051), was bred by Benjamin Rogers, 'The Grove' in 1874. He was sired by that excellent bull 'Horace' (3877) and out of the cow 'Blossom' by Sir Thomas, grandsire of 'Lord Wilton' and thus connected with the famous 'Sir Benjamin.' 'Grove 3rd' had no superior, if an equal, as a sire of prize stock.

As early as 1817, twenty-nine years before the first volume of the English Herd Book was established, Herefords were taken to America. Three small importations followed but it was not till 1860 when F. W. Stone of Guelph, began to import that any number of these cattle were brought into the country. Since that time the breed has made steady progress especially in the range country of the west.

About the end of the 18th century Herefords were large-framed, coarse boned animals with heavy front quarters and invariably short, light hind quarters. Before

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this time and for years after they were bred for milk production and draught purposes. This latter purpose was largely the cause of the extra development of front quarters.

Of late years the aim of the breeders has been to raise cattle with lighter, finer front quarters and longer better fleshed hind quarters. The rather prominent hooks of the past are now quite smooth and the distance between is much less, while the loin and ribs are well fleshed. Next to the Angus the Hereford comes nearest to the egg-shaped, rear-end conformation and finish.

In the time of Tomkins and Tully the colours were roan, gray or red with white markings and even to-day the Herd Book does not call for any standard colour, but red with white markings as described in the scale of points is the colour preferred by the great majority of breeders.

Slowly but steadily the 'Bald Faces' have made their way among the other breeds. They readily adapt themselves to varying conditions and changes of climate being equally at home in the cold northern or warmer southern ranges or in the stables of the east of this continent. As a breed they are hardly as large as the Shorthorns yet individuals have weighed as much. They are excellent feeders, but under long continued heavy feeding they are inclined to become patchy. However, it is for their grazing qualities that they have always been famous, not only in their own shire but over the United Kingdom and later over the plains of the Great Northwest of America. On the ranches they rustle well and are able to do without water for a long time. Another trait that is particularly noteworthy is the care the dams take of their calves; never leaving them to the attacks of wild animals.

The meat of the Hereford is tender and juicy and well marbled but rather coarser in texture than that of the Galloway. The milking properties, once fairly good are now much impaired through the way they have been managed. On the ranches they usually milk long enough to raise a calf well but they are easily dried off and rarely have any udder troubles—traits that commend them particularly to the rancher.

They are good breeders, often breeding to an advanced age even when subjected to high pressure feeding. When used on the common stock of the country Hereford sires impart, vigour, size, grazing and fattening qualities to their progeny.

Pedigree registration on this continent has reached high numbers, more especially in the United States where thirty-three volumes, containing the pedigrees of some 325,000 animals, have been issued. In Canada registration commenced about 1880, but it was not until 1899 that the first volume of the Herd Book was issued. Since then five books have been completed, and up to the end of 1909, 9,329 pedigrees had been registered.

THE GALLOWAY.

By David McCrae.

The district known as Galloway, in the southeast of Scotland, and now comprising Kircudbright and Wigtonshire gave its name to the hardy, hornless breed of beef cattle that have for many centuries been bred in considerable numbers on the uplands and rough pasturage of the district. The true Galloway is a hardy, well-shaped, profitable beef animal. Its body is long, deep and round; back straight and broad; leg short and stout; foot large; the coat of hair shaggy and black, with often a brownish tinge. Of all the hornless breeds, it has the oldest record. In herds it can be fed and handled like a flock of sheep, when carefully and kindly treated.

Much has been written about the origin of polled cattle; scientists have claimed one or other of the wild breeds as their progenitors. How or when the first were domesticated is unknown. Whether or not Jabel, the father of such as had cattle, had polled cows amongst his first herd, is not known, but it is known that polled cattle were described by Heroditus who wrote over 2,300 years ago. Heroditus says that the domestic cattle of the Scythians were without horns. Galloway was early

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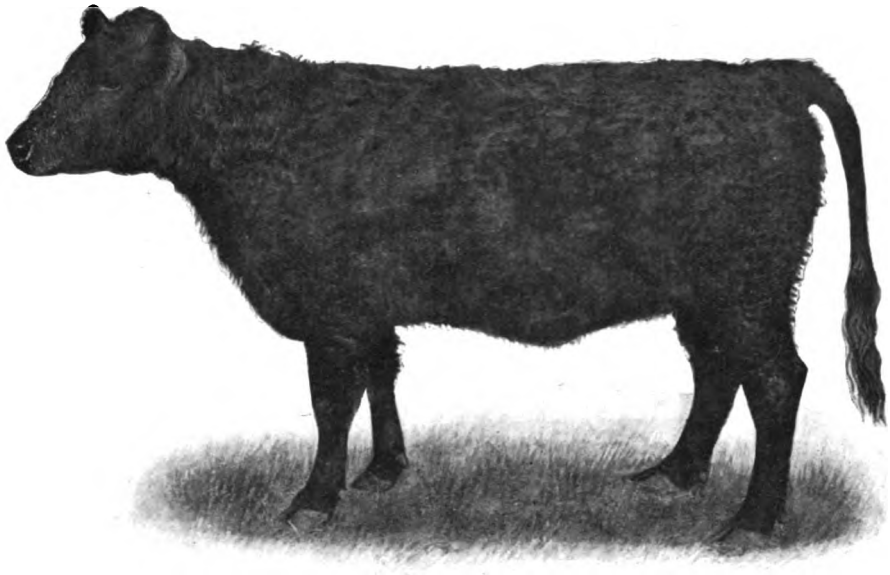

Fig. 17. Galloway two-year old Heifer, "Jane Seaton.'

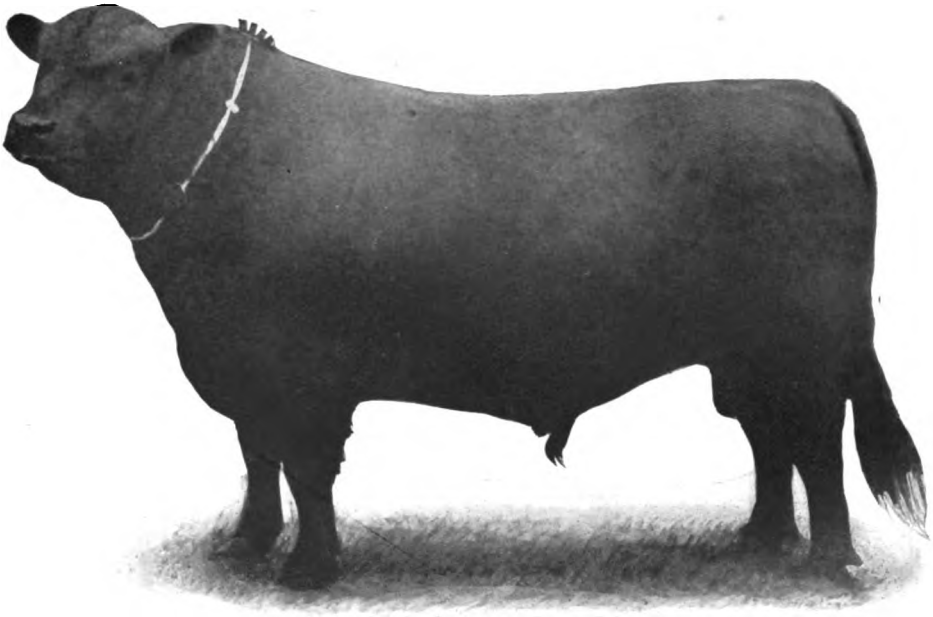

Fig. 18.—Galloway Bull, Chancellor of Ballyboley, Champion at the Show of the Royal Agricultural Society of England.

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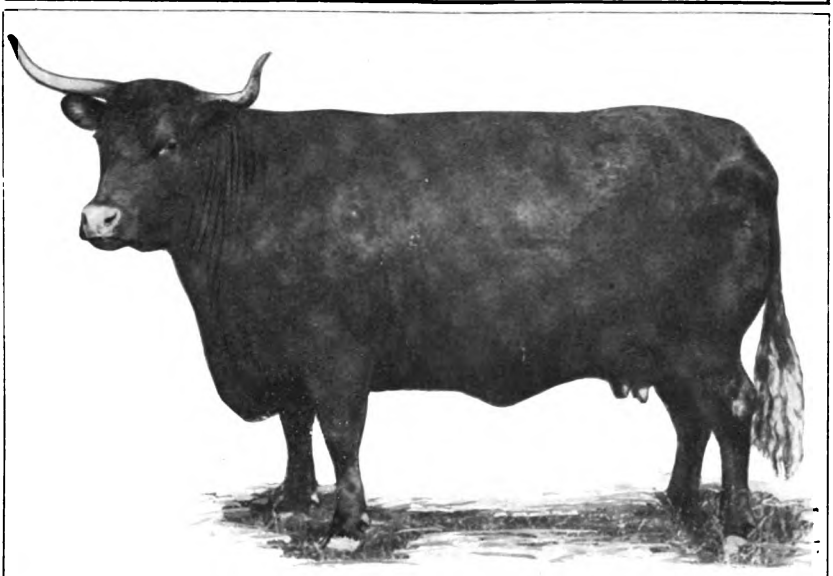

Fig. 19. Devon Cow, "Wimple Kitty."

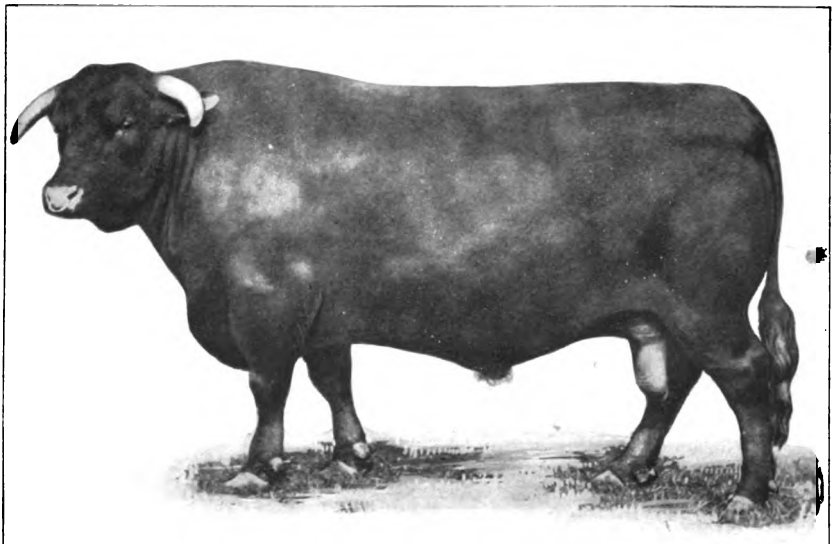

Fig. 20. Devon Bull, "Capton Plough Boy."

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Fig. 21. A winning Red Polled Cow at English shows.

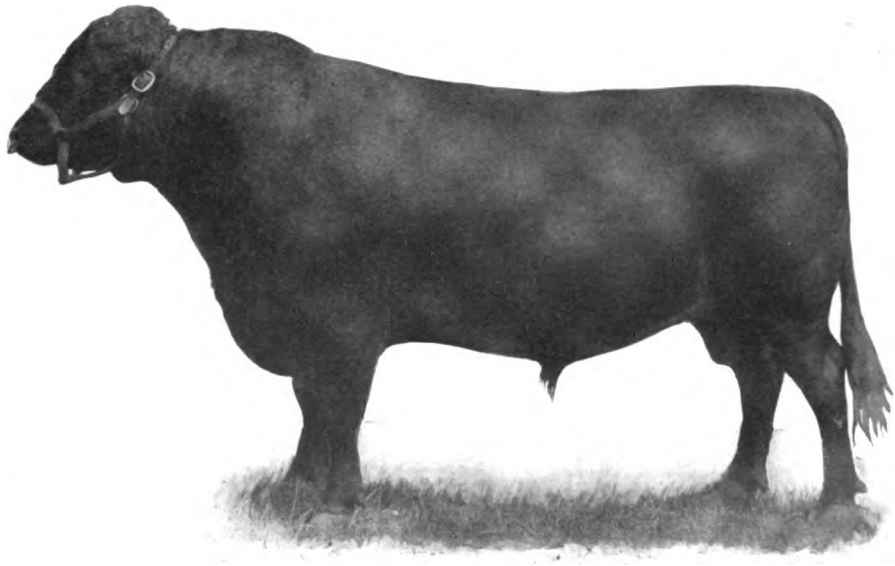

Fig. 22. Red Polled Bull.

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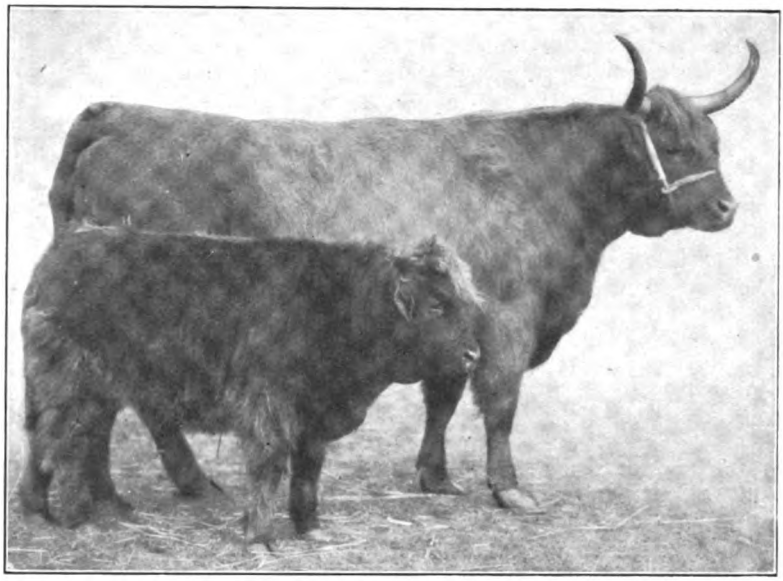

Fig. 23. Champion Highland Cow at the show of the Highland Society.

Fig. 24. A West Highland Bull.

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inhabited by the Picts, and Bede, one of the earliest English historians, known as the Venerable Bede, says: 'The nation of Picts, coming (as reported) out of Scythia,' what more likely then that from Scythia they brought their hornless cattle, and that these were the progenitors of the modern Galloway breed. Long before the union between England and Scotland considerable numbers of Galloway cattle were taken south to be fatted on the richer pastures of England. Their beef, of excellent quality, mottled and marbled, the fat and lean intermixed, gave them a famous name in the old days. In 1723, the author of 'A Journey Through Scotland' says he saw a thousand bullocks grazing in one park in preparation for the markets in Norfolk and Suffolk. Dairying and cheesemaking have invaded the old home of the Galloway, and it would now be hard to find a flock of a thousand in that section. They are still in the front of good beef-producers and at the Smithfield and other fat stock shows have taken a good place. A Galloway steer was recently returned as the Grand Champion of the Smithfield Show.

A considerable importation of Galloways was made in 1853 by Messrs. Graham of Vaughan, York county, near Toronto. Records were not kept by the Board of Agriculture till 1872. The descendants of that first importation are still numerous, and good enough to yet win in our larger shows. Geo. Miller, Markham; John Snell, Edmonton, Ont., (now Snelgrove); Wm. Hood and Thomas McCrae of Guelph, were also early and extensive breeders. The latter made many importations, and so far-reaching were his sales that, at the recent sales at the International Show, in Chicago, 1909, every animal but one in the scale was traced to stock at one time in this Canadian herd.

In 1871, J. N. Smith and R. B. Caruss, of Michigan, came to Canada and purchased herds of Galloways. Shortly after, Peter Davy, of Wisconsin; M. R. Platt and A. B. Matthews of Kansas City, and J. McHardy of Emporia, Kansas, bought herds and the descendants of these animals are now widely scattered over many of the United States. The latest success of the Galloways is that of the United States Government Farm, in Alaska, where, after a trial of several breeds, the Galloways have been selected as the best fitted for that northern post, and they are now using them for dairy purpose, as well as for beef animals.

Galloways are naturally polled. So marked is this polled character that the produce of a pure-bred Galloway bull with any other breed of horned cattle almost invariably gives polled calves. No other breed of polled cattle will equal the Galloway in this respect. Galloway cows crossed with a white Shorthorn bull produce the celebrated 'blue-greys,' the most famous feeding animals in that land. From this cross all animals are fed for the butcher. They not only feed economically but produce the highest quality of beef.

All improvement of the breed has come from within, by careful selection, and in recent years the advance in quality has been marked. Attempts at improving by crossing with other breeds, which have been often tried, have all failed. In the Canadian west, Galloways have been used for crossing native cattle, grades and others, with marked success. Their size has been quoted against them, as they look much smaller than the Shorthorn. They weigh much heavier than they look, and are always a first-class butcher's beast when ready for the block. The late Mr. Andrews, of the Crane Lake Ranching Company, reported that the steers from his Galloways weighed more in Winnipeg than those from his Shorthorn bulls. This he ascribes to their better rustling qualities. The Galloways he said, were always first out in the cold winter days, and the last to return to the bedding-ground. They are much the hardiest of all the beef breeds, and should be splendidly adapted for our extreme northern pastures in the great west.

Though Galloways are the oldest of the pure bred breeds of British cattle, their Herd Book records are very modern. Unfortunately all the papers and documents which had been collected relating to the breed, as well as the pedigrees, were lost by the fire which destroyed the Highland and Agricultural Society's Museum and Records in Edinburgh, in 1851. Since that time a new book was begun, and the first volume

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of the Polled Herd Book was published in 1862. This was compiled and arranged by Mr. Edward Ravenscroft, and contains pedigrees of animals of the Polled Aberdeen-Angus and Galloway breeds. Few of the breeders of Galloways joined in it. In 1878 the Galloway Cattle Society published its first volume of Pedigrees, arranged by the able secretary, Rev. John Gillespie, D.D., of Mouswald Manse, Dumfries. No pains were spared to make this Record full and complete. Several volumes have followed since that time.

Registration in the United States was commenced in the early eighties. Seventeen volumes of the American Galloway Herd Book containing upwards of 30,000 pedigrees have been issued.

Registration for the breed is now carried on in Canada under the National Records system. It was begun by the Agricultural and Arts Association of Ontario who published the first volume of the North American Galloway Herd Book in 1883 containing over 1,300 pedigrees. After this the Canadians joined for several years in the American Records but are now recording in Canada for the second volume of the Canadian herds.

THE DEVON.

The Devon, although a beef breed, demands recognition for its excellent dairying qualities. A quarter of a century ago there were more Devon herds in Canada than at the present time.

The home of the Devon is the counties of Devon and Somerset in the south-western corner of England. It is an ancient breed being descended, it is believed, from the smaller type of aboriginal cattle of Britain. The early English records show that the cattle of Devon were of much the same general type and colour as the present animals of the breed. As early as 1776 improvement is said to have been commenced. Francis Quartly did much to raise the standard of the breed. Previous to that time a demand for the cattle of Devon led to a depletion of the best specimens until pronounced deterioration had set in. Mr. Quartly with his son recognized this and not only refused to sell their best animals but purchased wherever possible the choicest individuals to be found. The result was not only a herd of excellent cattle, but others were induced to adopt the same plan until the breed had surpassed its previous highest standard. Early in the following century many herds of excellent cattle were to be found throughout the two countries.

The Devon is possessed of much individuality. In colour it is pronounced red, the shade varying from light to dark. White is permissible only about the udder of the cow and the scrotum of the bull and not beyond the navel or outside the flanks in either case. The hair surrounding the eyes and muzzle is of creamy tint and the muzzle flesh coloured. The head is lean, and clean cut possessing a refined appearance suggesting aristocratic breeding. It is crowned in the cow with a pair of shapely horns which are long and evenly turned up and of a waxy colour, tipped with a darker shade. The horns of the bull are stout and grow almost straight out from the head being only slightly inclined forward in any case. As in the cow the horns of the bull are strikingly matched. The neck shows refinement with trim head and body attachment. The body is medium in size, of blocky form, having well sprung and deep ribs and excellent heart girth. The legs are small and neat. In general form the Devon is stylish and its movements quick and graceful. It is a high mettled breed and possessing weight and stamina is highly favoured as oxen for working purposes.

The Devon is only medium in size being smaller than other beef breeds. Mature cows weigh from 1,000 to 1,300 lbs., bulls 1,800 to 2,000 lbs., and three-year-old steers, well fattened, about 1,200 lbs. The steers in Canada would be classed as butchers' rather than exporters although they kill out extremely well and yield an excellent carcass. In England two types are kept, one tending to beef the other to dairy formation. The former sort has won high honours at the Smithfield Show in competition

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with other breeds. The majority of the cows, excepting the thickest types, milk well giving a good quantity rich in fat. In the writer's early days a Devon cow 'Red Rose' (No. 607 Can. Record), a matron of a very good herd kept upon the home farm, gave an overflowing pail of milk twice a day during most of the summer. Official milking tests of the breed have not been reported, but 300 lbs. of butter a year is named by an extensive breeder as the produce of the average Devon cow kept under ordinary farm conditions.

Realizing the commendable qualities of the Devon it is remarkable that the breed has not made greater progress on this continent. Even at the largest live stock expositions few animals of the breed are ever shown and these are seldom brought out in such a condition as to indicate enthusiasm in their owners. Perhaps it is that they have not been taken hold of by pushing men prepared to accept the challenge of breeders of other sorts with a determination to win due recognition.

The recording of pedigrees was commenced in England about 1848 and in 1851 a Herd Book was issued. The first volume prepared by Colonial Davy was succeeded by six others, the last of which appeared in 1881. The year previous the Devon Cattle Breeders' Association organized and soon after took over the work of registration. The organization up to 1908 had issued thirty-one volumes of Davy's 'Devon Herd Book,' bringing the number of registrations up to 6,244 for males and 22,473 for females. Registration on this continent commenced in the sixties. The first volume of the American Devon Herd Book was published in 1863, since when seven volumes have been published, bringing the registration up to some 9,000 for males and 15,000 for females. A Canadian record for the breed was opened by the late Henry Wade at Toronto about 1868, but, owing to the small number of breeders in this country and the destruction by fire of a large number of pedigree records a volume was never printed.

THE RED POLLED.

The Red Polled comes nearer to the dairy type than any of the foregoing breeds. It possesses, however, qualifications that entitle it to consideration in a bulletin on beef production.

The native home of the breed is the English counties of Norfolk and Suffolk which border on the North Sea. The origin of the Red Polled, recently named by the Red Polled Society of Great Britain and Ireland the 'Red Poll' is not well understood. Some authorities trace it to the Galloway, others to the wild, white polled sore, while others again incline to the opinion that it was derived from the polled cattle of Southern Europe where cattle are possessed of a soft satiny skin similar to representative specimens of the present time. It is definitely known that the present day Red Polled breed is descended from two types or varieties—the Suffolk Polled and the Norfolk Red Polled. The former was noted for its milking qualities while the latter, also fair milkers, possessed more of the beef type. In 1774 Arthur Young, in describing the Suffolk Polled cattle stated that for two or there months a whole herd would average five gallons of milk a day per head, while single animals gave as much as eight gallons. The cattle were small, naturally thin of flesh and were either red, brindled or dun coloured and all were polled. The cattle of Norfolk county are described by early writers as blood-red in colour with a white or mottled face, having horns, small of bone, fattening as freely and finishing as highly at three years old as cattle do generally at four or five.' They were only fair milkers but improvement in this particular was earnestly undertaken by Jones Reeve of Wigton and Richard England of Bingham, who also undertook to evolve a type combining the good qualities of the Suffolk and the Norfolk in the one animal. This was a comparatively easy matter as the central homes of the two classes were only some twenty miles apart. These men bred to produce a solid red colour and in all probability used the blood of the Devon as well as that of the Suffolk, the former to establish the

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red colour, the later to dispose of the horns. Early in the nineteenth century the name Norfolk Red Polled began to be applied to the breed which possessed dual purpose qualifications. In 1846, according to Mr. Euren, secretary of the Red Polled Cattle Society of Great Britain and Ireland, a uniform breed of well established qualities had been formed. A few years later it had acquired the name Norfolk and Suffolk Red Polled, in 1882 it was shortened to Red Polled and in 1908, as already intimated, it took the name of Red Poll. The Canadian Association representing the breed have not yet adopted the latest English abbreviation.

It was not until 1873 that the recording of pedigrees was decided upon. In October of that year a number of representative men in equal proportion from each country met and drafted a standard description and also agreed that a Herd Book should be established. The following year the first volume appeared. In this and subsequent early volumes were recorded all trustworthy facts to be got respecting the progenitors of the cattle found in herds in the two counties. The early recorded herds were classed as tribes and groups, the first volume giving 25 groups and 233 tribes. These latter ultimately increased to 385 but have since been reduced to two hundred. Each group is indicated by a letter of the alphabet according to foundation stock. For example group 'A' comprises the cows in the Elmham herd and 'B,' the cows in the Biddell herd and so on. Thus 'A' 1 refers to the foundation cow in the Elmham herd, named 'Primrose,' while 'F' 3 'Joan,' is described as a good Red Polled cow in the Honingham Thorpe Herd. In 1887 the Red Polled Cattle Club of America published volume 1 of its Herd Book in which was condensed the first six volumes of the English Book. Subsequent English and American volumes correspond in their registration. Up to 1904 sixteen volumes of the American book had been issued, containing the pedigrees of bulls numbering up to 12,420 and cows 22,238, the animal bearing this latest number being 'Zinnil 3rd' tracing to the eighth daughter of 37 Beauty—W 2, which means that 'Zinnil 3rd' is descended from tribe No. 2 of group W.

The dual purpose type is represented in its truest form in the Red Polled breed. In many respects they resemble the Devon in form of body, but in being polled they present a striking difference in appearance and this is the more impressive on account of the prominent and beautiful horns of the Devon. The head is lean and breedy and presents the characteristic 'sugar loaf' poll. The neck in both sexes lacks the plumpness of the single purpose beef breeds, cows in milk being singularly pronounced in this respect. The withers are only moderately broad and full, but fairly level. The body is deeply ribbed and the back covered with flesh to only a medium thickness. Smoothness characterizes the hips and hooks, while the hind quarters present less thickness and plumpness than the heavier breeds. The udder has not received the attention that has been given to most of the dairy breeds. In many cases it is pendulous and lacks in the fore parts. It is seldom that a fleshy udder is observed and good sized teats are the rule. The colour varies from light to dark-red. While solid red is preferred, a patch of white on the udder or belly and a white tail switch is permissible. The red polled is a high spirited breed but less so that the Devon. In size it ranks much like the Devon but greater weights for bulls reaching in some cases 2,400 lbs. are recorded. Bulls of good type in breeding condition weigh from 1,800 to 2,000 lbs. and cows from 1,000 to 1,300 lbs., the latter being the weight of a show animal.

Red Polls are economical feeders and make excellent beeves, rather of the butcher than export class. Bullocks of this breed have won championship honours at the Smithfield Club fat stock show. On one occasion such a winner dressed out 73·75 per cent of his live weight. In another case a winner at 32 months old weighed 1,708 lbs., having put on 452 lbs. in twelve months. Again it is chronicled that a cup-winning heifer at two English fat stock shows weighed 1,578 lbs. at 33½ months old. No Red Polls have been shown at Canadian fat stock shows, but at Chicago in 1904 a steer in the two year old class weighed 1,680 lbs. and dressed 1,005 lbs. equal to 64

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per cent. It will therefore be seen that the breed may be classed amongst the beef producers.

Red Polled cows are good milkers. Records of from 8,000 to 10,000 gallons per year are not uncommon. At the Pan-American six months' dairy test in 1901, a herd of five cows stood fifth among the breeds showing a net profit of more than two hundred dollars. Among the fifty cows tested 'Mayflower 2nd,' stood second producing 6,161 lbs. of milk, containing 323 lbs. of estimated butter, showing a net profit of $52.10. In fifty-two weeks of 1900-1901, 43 cows in the herd of Lord Rothschild at Tring Park, England, yielded an average of 6,895·76 lbs. of milk. Official reports of tests show that Red Polled cows are good butter cows, the fat test usually running about 3·8 per cent, while higher than this is reached by individuals in almost every herd. At the Iowa Agricultural College, the Red Polled herd of cows gave yearly returns of 400 to 500 lbs. of butter, while at the Ohio College a cow of the breed gave equal to 440 lbs. of butter in a year.

The breeding qualities of the breed are high. That is to say, a male stamps his progeny to a pronounced degree. It is claimed that the red colour and polled heads are the almost invariable rule even in offsprings of the first cross. Other qualities of the breed are equally strongly transmitted.

The distribution of the breed in the United States is wide, extending into nearly all the states of the union. In Canada it is only recently that herds have been established. In the early nineties a small herd was imported by the Ontario Agricultural College and since then the increase of stock has been confined principally to western Canada where in 1907 the Canadian Red Polled Association was organized, soon after which the Herd Book for the breed was opened under the National Records system.

THE WEST HIGHLAND.

The West Highland is a distinctive breed, quite unlike any other sort that we have. It is picturesque to a degree and possessed of a majestic bearing such as might be expected in a breed bred and reared in a rugged country and a bracing climate. The native home of the breeds is the Uplands of Western Scotland, including portions of Argyle, Inverness and Perth Counties and the Hebrides Islands. The breed is believed to have descended from the aboriginal cattle of Britain. Being reared under rugged conditions, and often spare pasture, the Highland is diminutive in size, rough coated and hardy. In colour it is variable, being yellow, red, black, brindle and a mixture of red and black, the former colour predominating. Broken colours are objected to by breeders, although a single herd may show all of the colours named. The hair is long and shaggy when grown out, reaching in many cases a length of six inches. The head, more particularly of the bull, is very bushy and is surmounted by a pair of majestic horns which curve forward and upward with the points wide apart. The horns are white with light colours, and white with dark tips with dark colours. The colour of the muzzle varies from buff or flesh to a dark shade in harmony with the depth of colour of the hair. The neck is sturdy and bulls carry a mane of considerable length and heavy dewlaps below. The body resembles that of the Shorthorn in form, although of less size, the resemblance consisting of a straight back, broad loin, deep rib, and a general squareness of form strongly supported by short legs. The noble branching horns, full and fearless eye, broad muzzle and shaggy coat of solid colour impart a picturesqueness that has made the Highland bull the subject of many an artist's brush. Added to these features his beauty is still more enhanced by a graceful deliberate movement resembling the buck of the forest in his prime and in perfect freedom.

Although small of stature the West Highlander weighs well, cows averaging about 900 lbs. and bulls 1,200 lbs., although larger specimens are seen.

The breed excels in the quality of its beef, the grain being fine and fat is well distributed in the lean tissue; the flavour is superlative and the carcases being relatively thick, dress out well. In the leading British markets Highland beef com-

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mands the top price. The breed has not been handled for early maturing, these cattle feed up slowly and bullocks seldom reach the market under four years of age. In hardiness, West Highland cattle are remarkable. Their free life on the Scottish hills, where they graze summer and winter on grass and heather, has developed a ruggedness which enables them to withstand with little inconvenience hardships under which most cattle would succumb.

The first volume of the Highland Herd Book was brought out in 1884, largely through the influence of the Earl of Dunmore. It is issued by the Highland Cattle Society at Inverness, and some ten volumes have been issued.

The breed has not spread to any great extent, although herds have been established in several countries, including Australia, the United States and Canada. Writing some years ago regarding the adaptability of Highland cattle for the ranges of the Northwest the Earl of Dunmore said:—

> My average yearly loss has not been three per cent, which in a large fold of some four or five hundred head of cattle is very small. January, February and March are pretty hard months for them, as they get no food beyond what they pick up on the hills where they are wintered. I have often seen them scraping away the snow to get at the grass; but notwithstanding their being out all winter, they produce in April and May as strong and lusty-looking calves as a man could wish to see, with lots of bone and tremendous thick coats. That, to my mind, is the coming breed for the great northwest ranges.

Herds have from time to time been established in Canada but these have not been perpetuated for many generations. There are, however, in use a number of Highland bulls in ranch herds of Alberta, where they are especially adaptable, owing to their vigour which enables them and their offspring to withstand the occasional severe periods to which range cattle are subjected. The Highland bull is a prepotent sire, and there is no mistaking his progeny in a herd of mixed breeding. They have invariably, squarely built frames, thick middles and are close to the ground.

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THE BREEDING HERD.

A stream cannot of itself rise higher than its source, neither can cattle of superior quality be looked for from a herd of ordinary breeding and inferior type. To the man who would undertake the breeding of beef cattle it is of first importance that the foundation of his herd possesses the qualifications desired in the offspring not only in regard to breeding and type but in vigour and disposition as well. In an earlier section of the bulletin the ideal beef bullock is described. In that description the requirements of the breeder and feeder as well as those of the butcher have due consideration. If the utmost success in the raising of beef cattle is to be attained too great care cannot be exercised in the selection of foundation females and the choice of sires to be mated with them. No argument is required to convince the intelligent stockman that the beef breeds must be adhered to. That is to say the females should afford evidence of blood of one or other of the beef producing breeds and the more of it the better. Beef from dairy bred animals is not only inferior in quality and therefore of low value but it is produced at too great a relative cost. For hundreds of years the beef breeds have been reared to produce first meat and secondly milk. In a beef herd we want the maximum of the former and as much as is practicable of the later. What is wanted is 'motherly' looking cows, not too compact in conformation, and possessing that femininity of appearance that is so conspicuous in the matrons of every thoroughly successful herd. A coarse 'steery' headed female is seldom a successful breeder. Although she may yield a calf each year, her stock is not likely to possess the high qualities that one expects from the high class sire that should head every herd and is worth paying a good price for. Having the nucleus of a herd of the desirable type it is all important that a thoroughly impressive sire be placed at its head. The stock raisers of the Argentine have lessons to impart to many Canadian cattle raisers. Even for the raising of steers no price seems to them too high to pay for a sire of the best kind. Their wisdom is shown in the price received on the British market for chilled and frozen beef which is often equal to that received for fresh killed Canadian cattle. The bull then to head a beef herd should possess the qualities desired in his offspring and have the unfailing power of transmitting them. This power is indicated in two ways, first by his pedigree, and second by his masculine, courageous, vigorous appearance and demeanour. In addition it is of first importance that he possesses the desirable qualities of a beef animal described in an earlier section under the heading 'The Beef Bullock.'

Beef raising is carried on throughout Canada by two general systems of farming. Under one system the cows are milked and the calves reared largely on skim milk with supplementary foods. Under the other system the cows rear their calves which usually run with them constantly until weaned. In other districts when land is high in price and where mixed farming is carried on, the most has to be made of the milk, while the newer sections, including ranching districts, and where help is difficult to obtain, the cow must pay for her keep only through her offspring and in the end her carcass. In the former case it is all important that the cows be copious milkers, while in the latter it is sufficient if each gives enough for her calf, or if especially good, she may raise her own calf and that of another cow. The method of establishing a breeding herd is therefore divided and treated under two separate headings. The following article by Dr. A. G. Hopkins, in charge of the Health of Animals Branch in the province of Saskatchewan, deals with the general purpose herd, while the special purpose beef herd is dealt with farther on by Mr. Geo. H. Greig, the representative of the Live Stock Commissioner in Manitoba, Saskatchewan and Alberta.

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ESTABLISHING A COMMERCIAL HERD OF GENERAL PURPOSE COWS.

By A. G. Hopkins, B. Agr. D. V. M., Regina, Sask.

It may be asked why give this variety of cows, which some would have us believe are no-class, the prominence and attention suggested in the above heading? Several reasons may be adduced, the two most important being (*a*) the suitability of this type of cow for the needs and conditions of many farmers and (*b*) the care and knowledge necessary to secure them.

Under section (*a*) are to be included the moderate sized, valuable farms of Eastern Canada, whose occupants have no wish to devote themselves solely and entirely to dairying, but who wish to carry on a more interesting, less exacting, and perhaps quite as profitable a system, all things considered, of farming, with the added advantage that by the several lines of agriculture they endeavour to engage in there is less likelihood of loss from market glutting and depreciation in prices. Men who keep a few sheep, breed a few horses and who are open to sell some hay or grain when prices are sufficiently attractive, either as the raw material, as milk, butter or on foot as beef, mutton, pork or draught horses, will find the general purpose cow indispensible. Again on the prairie farms of the Canadian west, in the country where it is futile to attempt to divert farmers from growing wheat, the general purpose cow is destined to be the saviour from a situation, which now is depleting soils of fertility, causing the abandonment of swine breeding and making scarce as well, good butter, cream and beef. Space of time will not permit one to detail the misguided efforts of those who seek in one or more generations, as by an Aladdin's lamp to metamorphose grain growers into dairy farmers; attempts where made have been disastrous, leaving in many localities monuments to misdirected efforts in the shape of abandoned creamery and cheese factory buildings.

The general purpose cow can be procured by two methods, and from grade or pure bred herds of cattle, (*a*) by selection (*b*) by breeding.

The first method presupposes in the person making the selection, considerable knowledge of the attributes of a producing cow, and with an open mind as to form and type. While it will not be wise to lay down any hard and fast description, cows of the kind mentioned will be found to be either white, roan, red, or red and white in colour, more frequently the two latter colours, thus disclosing the predominance of Shorthorn blood, will be distinctly feminine in appearance, of moderate size, about 1,100 to 1,350 lbs. live weight, deep chest, comparatively large, not paunchy barrel, fairly thin in neck and narrow at top of withers, with a soft pliable and only moderately thick skin (it is an exception to find a good milker with the thick mossy hide desired on the beef type of animals), and with well developed, tortuous milk veins and large milk wells, a regular shaped udder, free of meatiness, yet a vessel withal unlike a dish rag in its texture or consistency. In addition, whenever possible, the general purpose cow should possess an authentic milk record of yearly production amounting to from 5,000 to 10,000 pounds, and should give an average test of butter fat of four per cent or thereabouts. The solid reds are frequently discriminated against, and experienced handlers will understand why. Whatever the reason, the fact remains that the medium-thick, red hide is rarely as pliable as one should look for, and the thick mellow, red hide usually covers the frame of a poor milker, albeit a good beeve. The dual wedge-shape should be preferred, the top of one wedge at the withers widening as one goes down, the other wedge widening from before back to the hind quarters; and select an udder with the teats spread well apart. This class of cows can at no time be termed 'neat little cows,' rather they are large and rugged with capacious udders and a marked tendency when dry to put on flesh. Grades of this type cost from $60 up, in the Union Stock Yards, Chicago. Occasionally one finds a cow of the type described at farm sales, but the bidding for this kind is always brisk, as the value of such cow is known.

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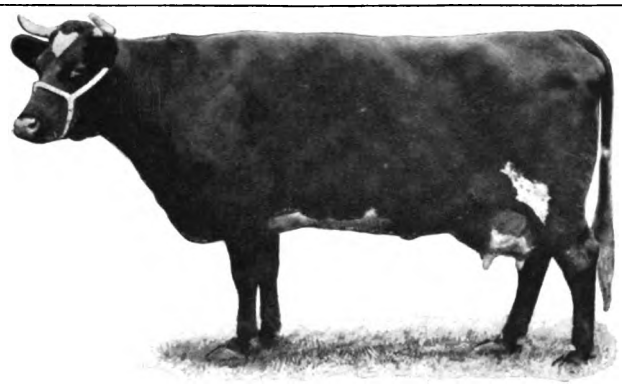

Fig. 25. Milking Shorthorn Cow, "Priceless Princess," gave 8,505 lbs. milk with first calf.

Fig. 26. Milking strain Shorthorn Bull, "Prince Pericles."

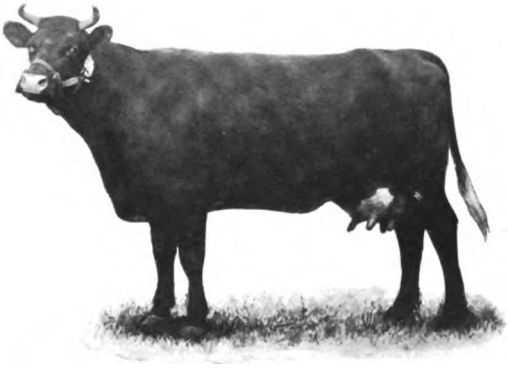

Fig. 27. Milking Shorthorn Cow, "Babraham Darling Lady."

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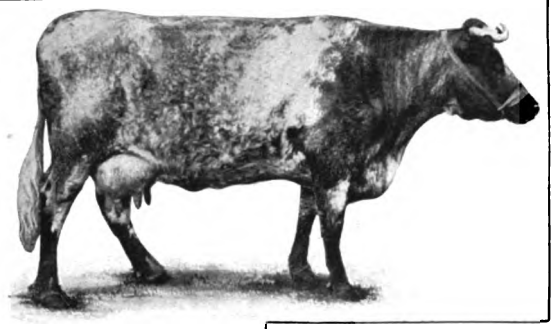
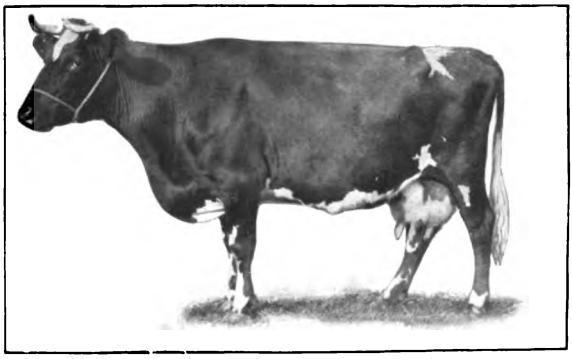


Fig. 28.
Milking
Shorthorn Cow
"Darlington Cranford."
Winner at many English
Dairy Shows.

Fig. 29.
Milking
Shorthorn Cow
"Lulu," owned by the
Missouri Agricultural
College.
Gave 12,341 lbs. milk in
one year.

Fig. 30.
Milking Strain
Shorthorn
Bull "Magna
Charta."

Fig. 31.
Shorthorn Cow
"Moppy Gem 2nd."



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When one comes to consider the breeding of this type and variety of cows, other factors must be taken into consideration, viz.: the sires to be used, the dams to be bred from and the upbringing of the heifer calves. Incidentally it may be here stated, (whether or not the dams employed for the purpose are pure or grades), the bulls must be pure-bred registered animals, and should be from dams, and if possible granddams, with yearly milk records. This is the most important point in the selection of the bull, after which masculine character, and fidelity to breed type may be considered. No time need be wasted in endeavouring to secure a bull which in form approximates to what is known as the dairy type, (as laid down by the dairy breed exponents), to do so would be to forget two things, first, the milking tendency is largely a matter of habit, training and development; second, the fleshing tendency must be exemplified in the male. No harm can result if the bull possesses well developed rudimentary teats, many breeders rely on these as an indication of ability to beget good milking females. The type of bull required will be most easily found by the general farmer in the Shorthorn ranks, although where herds of Red Polls are to be found, sires capable of transmitting general purpose character may be had, with this difference that in size and in milk yields the average will be less than if a Shorthorn bull is used. Constitution must not be overlooked, and avoid the hard handling kind. When we come to the dams, the necessity for careful selection becomes evident, the thick beefy, masculine or steery headed females must be avoided, or what is gained by the use of a sire from a well marked milking ancestry would be lost or mitigated to an undesirable degree. Females as already described (and illustrated) should be selected and if mated with a pure bred bull from ancestry of persistent ingrained milking proclivities, the results in the progeny will be found to be satisfactory. The male progeny, if pure bred, should be carefully culled and the culls steered, the entires being raised as well as possible, but not allowed to suckle their dams. The heifer calves should also be pail fed and given a diet to induce growth and flesh rather than fat, in fact they should be kept growing until calving for the first time, which should take place as nearly as possible when thirty months old; if calving is postponed long after that time, there will be a tendency to develop fat throughout the system, including the mammary glands, rendering it impossible by subsequent treatment to bring these glands to their greatest activity or fullest capacity; if on the other hand the heifers are bred too early, constitution, size and vigour will be lost, and the ends of the breeder defeated thereby. If possible, the heifers should be mated with a sure mature bull of proved ability to beget good milkers. It should hardly be necessary to state that the attempt to build up a herd of the kind of cows described will be wasted effort unless the heifer calves are properly handled, the heifers and cows milked as long and as thorough as possible and milk records kept—records which should form the basis for culling out misfits. Bran, oats, clover and good pastures, water and salt are the breeders' adjuncts—roots, silage or fodder corn will also be useful, but the fattening feeds must not be used during the heifer's growing or milking days.

The careful observer desirous of building up a grade herd may by taking his time pick up females here and there at farm sales, although for cows of this type competition is always brisk and for bulls he must go, either to the few, very few breeders on the American continent or to Great Britain, where a yearly increasing number of Shorthorn breeders are keeping milk records. In the North of England may be found herds of unregistered (but practically pure bred) dairy Shorthorns; at the Central Experimental Farm, Ottawa, are a few pure bred dairy Shorthorns, (one a cow who in the lactation period following her second calving, produced 10,000 pounds of milk in twelve months), at the Macdonald College, Ste. Anne de Bellevue, Que. is the nucleus of a dairy Shorthorn herd, unregistered; at the Iowa Agricultural College are some dual-purpose Shorthorns; but to see the real article in any numbers the London (Eng.) dairy show is the place. It will not be amiss to quote a few pure bred records made in an English Shorthorn herd.

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Countess Babraham, with first calf..	5,602 lbs. milk.
Dora Darlington, in one year..	7,901 " "
Priceless Princess, with first calf..	8,505 " "
Fanny, in one year..	872 gallons.
Fanciful..	937 "
Lucy, eight year average..	7,496 lbs. milk.
Darling 6th, six year average	6,881 " "
Clarissima 2nd, seven year average..	6,070 " "
Ingram's Rose, gave in nine months..	6,745 " "
Norah 6th, in one year..	7,765 " "
Oxford Ada, in one year..	10,260 " "
Lady Crystal Bates, with third calf..	8,845 " "
Hilda's Crystal, in one year..	6,170 " "
Red Pippin, in one year..	7,604 " "
Lady Coquette, with second calf..	5,868 " "
Babraham Darling Lady, with third calf..	6,799 " "
Lady Evelyn Bates, in one year..	5,860 " "
Babraham Lucy, with first calf..	7,901 " "
Jessamine, with second calf..	7,860 " "
Ellesmere Graceful, 4th, in one year..	6,524 " "
Moppy Gem 2nd, three year average..	10,015 " "
Babraham Penelope, with first calf..	6,223 " "
Babraham Daisy " " "	6,660 " "
Carrie 23rd, in ten months..	7,677 " "
Royal Heiress, in one year..	11,641 " "
Princess Raglan, four years average...	7,571 " "

The list above given of twenty-six producing cows from one herd of the type known as general purpose or dual purpose cows, is evidence that the project is feasible, that it is desirable is admitted; the records of the progeny of the above females are very promising and the bulls in use are from heavy milking dams. The following paragraphs from the *Estate Catalogue* give in a nutshell the idea sought for and the method followed to attain that end.

> The ancesters of the present herd were purchased in 1896, for the purpose of establishing a herd of Dairy Cows eligible for Coates' Herd Book, the object being to breed heavy milkers, with robust constitutions, which could be easily fattened when discarded from the dairy.
>
> That the cows should yield a large annual return of milk was of primary importance, as a large retail dairy business, was being worked in connection with the herd; this dairy business has since greatly increased.

Shorthorns fulfilling the above requirements being needed, the bulls used on the herd have all been selected from heavy milking cows; the calves are weaned from their dams when only a few days old, hand-reared and brought up in a natural healthy breeding condition.

> From the outset every cow's milk has been weighed night and morning, their milk yields carefully recorded, and indifferent milkers weeded from the herd, with the result that at the present time the cows are good milkers and prolific breeders, the heifers calve down with good shaped udders and promise to develop into valuable dairy cows, and the young bulls are sought after by dairy farmers and others who recognize the necessity of using bulls from dams possessing dairy qualifications.

Further the English Dairy Shorthorn Association includes over seventy breeders, the list including some of the most noted herds in the United Kingdom. Doubtless many readers have noted in both pure bred and grade herds, individual cows, heavy persistent milkers, of good size and with a tendency to flesh up when dry; one particular noteworthy grade cow 'Rose' was in the dairy herd of the University of Wisconsin in 1899-1900, and made a record in one lactation period of over 500 pounds of butter. A steer from this cow got honourable mention at the International Chicago, December, 1900.

One cannot do better than reiterate, for the guidance of those intending to establish a herd of general purpose cows, the methods followed in the herd especially established for the purpose some fourteen years ago from which the records above are taken.

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In order to fulfil the requirements of a commercial herd, it must be demonstrated that the class of cattle referred to are money makers. In the English herds adjacent to the cities, the milk is sold for human consumption and the dairy business of this kind is considered one of the most profitable systems of agrieulture followed. Adjacent to the metropolis, London, a commercial herd of one hundred head of general purpose cows is maintained. The cows are milked for about four years and are then allowed to go dry, are fitted up and sent to the block. Cows of this type are large consumers of roughage (cheap food such as hay, straw, roots) and comparatively small consumers of concentrates (grain, the more expensive portion of the food), consequently are economical producers of milk and butter fat. One of the best pieces of evidence of the value of this type of cow is the continual demand for them at the stock yards, Chicago, from which place they are later shipped to supply dairymen at Buffalo, Pittsburg, Philadelphia, Jersey City. The dairymen at the points mentioned like the 25 to 30 quarts a day cow which when through with milking, can with a little grain and grass be put into such shape that he gets back the money paid for the cow. The general farmer cannot do better than try to breed the type described, whether for sale or for use on his farm; the centralization of creameries and the increase of separators have brought about conditions specially suited to the man with this type of cattle. In the usual farming community there is a very limited demand for veals, hence the special dairy breeds are not the best for any but the special dairyman to breed and raise. Good care, intelligent selection and the keeping of milk records together with the use of Shorthorn sires from heavy and persistent milking dams, will if observed bring the farmer success in his efforts to establish a commercial (which I take it to mean profitable) herd of general purpose cows.

Bullocks from General Purpose Cows.

A fear may be entertained that to develop the milking qualities of beef bred cattle would be to impair in like proportion their beefing tendencies. The flesh yielding characteristics of the dairy breeds would naturally lead to this conclusion, and no doubt breeding exclusively for milk would result in an alteration of type and a general departure from the strictly beef Shorthorn as it is understood in the showring. It is only, however, when a breeder utterly neglects the beefing qualities of his herd by making dairying a specialty that he is likely to sacrifice the beefing powers of his herd. The relationship of the heavy milking general purpose cow to the beef bullock is well described by 'Spero' in the *Live Stock Journal* (London, Eng.,) of February 19, 1909, as follows:—

> Let us glance at the dual-purpose cow as she strikes the dairy farmer who is also a grazier, and wishes to turn out some good steers or sell his bull calves to others to rear and feed. Although the exhibitor in the open classes at our shows can rarely win with a heavy milker, it does not follow that the ordinary British dairy farmer, in order to have 1,000-gallon cows, need sacrifice his beef value by breeding light-fleshed cattle approaching the Channel Island type. Let us take a case in point which has just come to the writer's notice. A dealer bought twenty steer calves from Mr. R. W. Hobbs' large herd, bred from cows yielding an average of about 1,000 gallons yearly. They were sold to a farmer in the neighbourhood, reared and fed by him, and sold at last Christmas' markets where prizes are given. Altogether, these steers from heavy milkers won £30 ($146.00) in prizes, and were sold at the average of £24 15s. 3d. ($125.00) each, being about thirty-three months old. The highest price was £31 ($150.00), and the lowest £19 ($95.00). To obtain such results requires much care and skill in breeding. It may be easy enough where beef points are made the chief consideration, but here we have a lot of good farmers' bullocks, bred from unmistakably deep-milking, pedigree Shorthorns, and what is done by one breeder can be done by others.

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THE BEEF HERD.

By Geo. H. Greig, Representative of the Live Stock Commissioner in Manitoba, Saskatchewan and Alberta.

The conditions under which the ranching industry have been conducted are undergoing a rapid change, and except under very special circumstances, the day of the 'big ranch' is gone. The settler with his dogs and barb-wire fences, is pre-empting the watering places, and it is no longer possible to run cattle in big herds. Throughout southern Alberta and southwestern Saskatchewan hundreds of thousands of acres of the best grass lands in the world have been furrowed by the plough of the settler; irrigation ditches are carrying moisture over millions of acres of semi-arid territory, and wheat and oats of the highest excellence yield abundantly. So promising is the winter wheat industry that 'Alberta Red' is already a recognized grade of superior quality, and a new outlet to the markets of the world is now being sought via Vancouver and the Pacific. Alfalfa and sugar beets also return magnificent yields. It is not a far cry to the day when large numbers of export cattle will be finished during the winter on alfalfa hay, and the residue of the sugar factories on farms adjacent to the ranges where they are raised.

Notwithstanding the fact that vast areas of territory in these provinces, long considered worthless for agriculture and fit only for grazing purposes, are now being invaded by the homesteader, there is, and will for years to come, be plenty of room for the small rancher as well as for the combined farmer and rancher. Districts remote from railroad, or where the surface is rough and rolling are likely to retard the advance of the settler for many a decade. The climatic conditions are so peculiarly favourable to the economical production of live stock that the industry will in the end not suffer from these changed conditions. In fact the output of beef will increase rather than diminish. The establishment of many small herds will tend to the closer supervision and better care of the stock; better bulls will be used, and a larger percentage of calves will be raised. Provision will be made for winter feeding so that in case of severe storms the losses, if any, will be light.

On the ranch-farm, or farm-ranch, where conditions make it impracticable to milk more cows than just enough to supply the household necessities, the calves run with the cows, and it is therefore not desirable to have cows of highly developed milking propensities owing to the difficulty of giving proper attention to the udders immediately after calving, and until such time as the calf can take care of a liberal supply on its own account. This danger may be more imaginary than real, and, in establishing a breeding herd it is probable that the best females, grades of any of the beef breeds, will be found none too good. However, a man must be governed largely by the depth of his purse, and a good start may be made by shrewd and judicious selections of even very commonly bred females.

Bulls.

Too much importance, however, can hardly be placed on the selection of sires for use on the herd. Bulls of any of the distinctly beef breeds will produce good results. It is well, though, to follow along one line of breeding in order to get as uniform a herd as possible. In selling beef or breeding stock, uniformity of type and colour count. Herefords, Galloways or Aberdeen-Angus are very prepotent and will impress their particular markings very strongly upon their offspring. The Hereford will reproduce on almost any cross the white face and white lines and markings on a body colour of red. While the Galloway and Angus will as surely produce a mooley and nine times out of ten paint him a solid black. The Hereford and Galloway are particularly good rustlers, and the Angus are excellent finishers. It is, however, not so easy to obtain, at reasonable prices, large numbers of bulls of these breeds, that are of high uniform excellence owing to the comparatively limited number of herds in Canada. Shorthorn bulls are obtainable in large numbers, but discretion in selecting them is of no less importance on account of the general popularity and great numbers of the breed. The red, white and roan of the latter breed does not

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tend to a uniform colour scheme in the herd, but reasonable care in the selection of bulls will result in a uniformity of type. The Shorthorn is a fairly good grazer, and is unsurpassed as a finisher, either off grass alone, or under heavy grain feeding. The blood lines of the bull, of whatever breed may be decided upon, cannot be of too high quality. Select the best breeding you can afford, providing other points are satisfactory. They must be of the beef type with good backs and loins and deep ribs. Two year old bulls are generally preferred and they should be raised under conditions which will have given them plenty of growth and unimpaired vitality. Young bulls kept for months tied up in stalls or even run in small loose boxes floored in manure in warm moist stables, are sure to go off on feet or legs when subjected to any strain. Even the strain of shipping is often sufficient to start trouble. Strong, vigorous, masculine chaps, well conditioned but not overly fleshed, with good coats of mossy hair, are the kind wanted.

The bulls intended for use on the herd, whether few or many, should be run in roomy paddocks, supplied with nourishing food, to fit them for their season's work. During the breeding season if the bulls can be kept up so much the better, the fewer bulls will be required. When run with the open herd, it is estimated that one bull is required with every twenty-five females.

Calves.

Under this system of cattle raising, the cows will be bred to calve late enough in the season to ensure favourable weather conditions for the calf crop. For the balance of the summer, the cows will take care of the calves, but they should be taken up in the fall before the weather gets too cold or they will lose much of their calf flesh. Under farm, or semi-ranch conditions, where the number to be handled is not so large, special care should be given the calves during their first winter, and, even on the large range, the calves should be cut out into separate herds, placed on the most favourable pasture, with some shelter, if possible, provided, when necessary, with hay of good quality, or some green cut oats, and sometimes even uncrushed oats can be fed to advantage. No elaborate equipment is necessary, the hay can be fed in cheaply constructed racks or scattered on the frozen ground. Where the calves are stabled, their quarters should be roomy, clean, always well bedded, not too warm, with a dry atmosphere and good ventilation. No better feeds than above mentioned are required to retain calf flesh, and keep the youngsters growing, but of course if a little linseed or crushed flax, some roots or other succulent food can be added, correspondingly greater gains will be made. Of course an abundant supply of good water (if the chill can be taken off so much the better) must be available and salt should always be within reach.

It is important that all male calves should be castrated early, at about two weeks old is probably the best time, but where this is not practicable, on the open range for instance, the operation should be performed as early as possible, and this is generally done when the calves are branded.

Yearlings.

No matter how much or how little care has been exercised in the breeding and feeding of the young bovine up to the time he attains the distinction of being a 'yearling' he is henceforth expected to rustle for himself. From the quarter-section farmer, with his half-dozen calves, to the big rancher with his thousands, it is all the same, the 'yearling' is not expected to require any further attention until he can be cut out into the beef herd or turned into the feed lot, and yet it is at this stage that it would seem that both the rancher and farmer could very materially increase his profits. The yearling steer 'roughed' through the winter may grow bone and gain in size, but he does not hold his flesh, whereas were he given a meal ration, a small one of say two or three pounds per day, he would not only make better growth, but he would also hold his flesh and in the end attain his beef maturity almost a year sooner. This is a point that has not received much attention but is one of vital importance from a profit making standpoint.

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REARING AND FINISHING.

Having established a uniform herd of vigorous cows of good beefing quality one has made a long step forward towards the production of high-class steers for the market. Important as are the cows in determining the quality of the offspring it is even more important that the herd be headed by a thoroughly good bull, good not only in conformation, vigour and disposition but in breeding as well. It is not enough to know that he has a recorded pedigree, nor even that both his sire and dam were good individuals. The generations before these have a powerful influence and one looking for a herd bull cannot be too careful to assure himself that for several generations his parentage have been good individuals and the cows copious milkers. With a herd of good cows so headed the stockman has the foundation laid for producing steers of the highest quality.

THE YOUNG STOCK.

Owners of comparatively small herds, especially those who milk their cows, as a rule prefer to have their calves come in the fall, while ranchmen and others who prefer to winter cheaply and allow the calves to run with their dams select the spring as the proper season for the calf crop. In the autumn the cow is in fine physical condition after her season's grazing and therefore yields a vigorous offspring. Then with good stabling and feed and a painstaking herdsman the calf gets a fine start in life under the direct eye and personal supervision of the owner. This on high priced land counts for much as every pound of food given should return a corresponding gain in weight. Animals produced and grown for beef should be liberally fed from birth until finished so as to reduce to a reasonable minimum the time of growing into the size and condition for which the markets pay the highest price and this at the season of year when values are at their highest. In practice the most prosperous cattle feeders who raise their own steers market from March to July at ages ranging from 27 to 30 months old. Such cattle are as a rule dropped in the late autumn or early winter months. Nor should the spread of calving time for the herd be more than is necessary as uniformity of size in calves or older cattle is not only a feature to the herdsman but always more attractive to the buyer. It is a comparatively simple matter to care for calves that are allowed to suck. A copious milker will rear two calves leaving one cow to supply milk for other purposes. Calves do better when housed apart from their dams and let out to suck three times daily for the first month and twice daily afterwards. When allowed to run with the dam constantly they not only worry and drag her down unnecessarily but depend upon the udder long after they should commence to take food from the trough. In almost every herd there are good cows that are tough or otherwise troublesome to milk. It is the custom of some to put two calves on these allowing them to suck twice a day for five months when they are weaned and a third calf put on. Three very good calves can be raised on a cow in one season with very little labour.

The Calves.

The great majority of beef cattle raisers, more especially in the older provinces, rear their calves at the pail. Opinion appears to be about equally divided as to whether the calf should be removed at once after birth or allowed to suck for two or three days. The latter plan has always appealed most strongly to the writer as the calves appear to get a better start. Those who favour the other plan claim that it gives less trouble as the cow does not fret so long and the calf that has never sucked is more easily taught to drink. Either plan is satisfactory if wisely managed. No calf intended for beef should be deprived of new milk in the whole state for at least two weeks. It does not answer so well to give the milk of another cow unless she too is newly calved as the milk of a cow long calved is very likely to cause digestive

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derangement in a very young animal. Many of the most successful feeders continue feeding whole milk for four or even five weeks, believing that it pays in weight made. It is an easy matter to over feed a young calf, causing indigestion and perhaps a pronounced unthrifty condition. Three pints morning and night and two pints at noon for a few days is quite enough and this should be very gradually increased to from four to five quarts twice daily at the end of four weeks.

The change from whole to skim milk should be made very gradually. Not more than one pint of the whole milk should be substituted by skim at first and this may be increased day by day until in two weeks the change to skim milk will have been completed. As the whole milk is taken out the deficiency should be made up by adding a small quantity of flax seed jelly. To make this for one calf allow a desert spoonful of flax seed to simmer (not boil) in a pint of water for several hours on the back of the stove when it will become a jelly. This quantity is fed twice a day and week by week increased until when the calf is three and a half months old it is receiving the jelly of half a cup of flax seed twice daily. Some feeders use well cooked porridge made from oat meal and fine shorts along with the flax jelly and milk, but in using these one has to exercise great care to see that the food is agreeing with the calf. At the first signs of poor appetite or scours a return should be made to new milk for a few days and after a complete recovery the return to the mixture should be gradually made.

Each calf should be fed by itself out of a clean tin or galvanized iron pail which should be kept thoroughly sweet and clean by washing and scalding after each feeding. Much annoyance and difficulty may be avoided by providing a small stanchion or stall for each calf. If kept fastened in these while feeding, and for half an hour afterwards, all crowding is avoided and the calves do not acquire the habit of sucking each other. Have the manger so constructed as to hold securely the feed pail and when the calf is old enough to eat chop if a small quantity is placed before it after the empty pail is removed, the calf will very soon learn to masticate this solid diet. Since more or less milk is sure to be slopped over into the manger it is important that it be scrubbed out frequently in order to keep it clean.

The ideas of even successful feeders are not uniform as to the best age to commence giving coarse food. Some place a small quantity of suitable fodder at their disposal when they are two weeks old allowing them to take what they want at their own discretion. Others believe it is better not to encourage the eating of coarse foods until their stomachs are so developed that they will start to chew the cud. This is generally from two to three months old. In all matters of this sort it is generally safe to follow the inclination of the animal by placing food within reach when the calves are about three weeks old. Clover hay, preferably alfalfa, is safe to commence with. A small quantity should be given in a rack daily. Then a handful of pulped roots with bran or ground oats should be placed in a flat bottomed trough. This should be replenished each day, once or oftener, whether eaten or not and the trough kept thoroughly clean. When the calves have learned to eat well no more should be given than is readily eaten up as this means the appetites are kept good and digestion keen and on this depends the thrift of the calf.

Whether the calf is to be rushed along for baby beef, finished at 18 to 24 months old or kept six months longer, will influence the liberality of feeding after the first winter. In any case it is safe to wean at from 6 to 7 months old. If baby beef is desired the grain ration must be continued right along in liberal quantities but otherwise a small feed twice daily along with a plentiful supply of grass will maintain a steady growth. After a calf has reached two months of age a mixture of whole oats and bran in equal parts is a good ration and if flax seed jelly is not being fed a small quantity of oil cake meal added will help. In quantity three-quarters of a pound of the mixture per 100 lbs. live weight per day is considered about right for growing calves. Some recommend mixing chop with the milk fed but this is not good practice because the solids are carried past the first stomach where they should be partially digested.

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Fall calves may be grazed most of the summer if the pasture is good and a shade provided but later born animals are better to be housed at least during the days of warm weather while the flies are bad. Undoubtedly the best calves can be raised by housing in comfortable sheds and having the grass brought to them, but few care to perform the labour necessary to such a course and then there are advantages to the future of the animals if they learn to graze the first summer. In any case they should be protected from extreme heat and flies and receive a grain ration once or twice daily in addition to abundant green food. As cool autumn weather comes on they should be housed at night and allowed to graze during the day; it helps wonderfully to give them a run on rape or a daily feed of green corn run through the cutting box.

The Yearlings.

By the beginning of winter the calves will have become yearlings and on a fair way to beeves. They should now be housed in loose boxes or pens and those that run together should be about the same age. Unless the pen is roomy it is wise to allow them a chance to exercise in a yard or open shed for a short time each day. There is no advantage in having the pen warm, but it should not be cold or draughty. A constantly comfortable bed with good ventilation and plenty of light add to the well doing of the youngsters.

It is common practice to exercise too great economy in the feeding of yearling steers. Unless they are kept growing well during their first winter out of calfhood much time and feed is lost. It is well understood that the gains made from light feeding are relatively expensive. Other things being equal the cheapest gains are made on full feed. As the ration is decreased from that point the food required per pound of gain increases uniformly until a maintenance ration is reached, when, all of the food given is wasted when considered from the standpoint of gains made. When the ration is reduced to a point that the animal looses weight the deficit to be met is not only the total cost of the feed used but the value of the loss in weight as well.

At this age it is not always profitable to feed heavily. Unless a steer is to go out as baby beef what is wanted is the maximum of growth without much fattening. At this age the tendencies of the entire organism are to convert food into growth and every advantage should be taken of this. If baby beef is the object the quicker they are made fat the greater the profit in feeding, but if not they should be made to utilize at least a portion of the cheaper fodders of the farm. For steers that are to graze the following summer with little or no grain ration it is of no advantage to feed a heavy grain ration during the winter as the gains made on the grass will not be as great as though the animals were less fat but growing and thriving well when turned out.

The provident feeder will have supplied himself with a generous quantity of nourishing dry fodder and succulent food as well. Where it can be successfully grown corn ensilage has become the popular fodder for cattle of all classes except calves. It is bulky, nourishing, palatable and succulent and with it straw can be utilized to advantage. There are still many feeders who adhere to roots as the succulent part of the ration, but when a feeder has given ensilage a fair trial he seldom returns to roots to the exclusion of the other food. A supply of both is undoubtedly the ideal provision as variety of diet is an important consideration in cattle feeding. If the cattle are to be carried over another year little hay need be fed during the winter when the ration should consist of corn ensilage with a little cut straw, all that may be eaten twice daily; a small feed of roots and long hay (preferably clover) once daily and enough of grain chop to insure rapid growth without fattening. The grain mixture may consist of whatever is most readily secured and the quantity fed will be guided by the intelligence of the feeder. If the cattle are to be turned off finished during the early summer both hay and grain should be more liberally fed. A good standard ration for cattle at this period to be turned off at 24 months old is roots or ensilage 20 to 30 lbs.; hay, ¾ and straw ¼, all that may be eaten; chop 1 to 2 lbs. per day. With such

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a daily ration intelligently administered stockers will go out in fine condition to advance rapidly on pasture.

Good pasture with plenty of water and shade will suffice for the following summer. Towards autumn it may be necessary to provide a supplementary ration such as green corn or a field of rape. In any event there should be no lack of food. Every pound made should be held, and growth should be continuous and rapid. Even though fall pastures are abundant a run on a field of rape before housing will give the animals a fine start for the coming winter which in many cases is the finishing period except perhaps those that are to be marketed off grass the next summer.

FATTENING IN CENTRAL CANADA.

Success in beef raising depends a great deal on the method of fattening. At best it is an expensive process and unless wisely managed the expected profits may be wiped out and a decided loss experienced. The preceding sections have described the proper kind of cattle to feed profitably and the method of rearing them up to the beginning of the winter which should constitute the fattening period.

In the provinces east of the Great Lakes two general systems of fattening are followed. In many districts the cattle are finished to go out from March to May while in others the finishing is continued on pasture until June, July or August. In the western provinces, both winter and summer fattening are in vogue. The systems followed there are described in another section of this bulletin. In order to arrive at the best systems of fattening cattle sets of questions covering the principal points in the process were submitted to a number of the leading feeders who have for many years been successfully fattening steers on a more or less extensive scale. In addition to the valuable information submitted by these men the lessons learned from the experiments conducted at the experimental farms have been drawn upon and these with the practical knowledge of the writer form the basis of the following treatise. On account of the differences, climatically and otherwise, cattle fattening in Ontario and Quebec differs to some extent from the systems followed in the maritime provinces. For this reason the subject is divided, the methods in Central Canada being dealt with first.

The great bulk of the well finished cattle sold off Ontario farms are given a fattening ration for from 150 to 180 days. A comparatively large number are put off at from 90 to 150 days while another section of feeders keep them on for 200 days or longer. The 150 to 180 day feeders put up their cattle in the fall, usually about the middle of November start them off on a light grain ration increasing it gradually until a full ration is reached in about three months. They are then ready for the market in April or May. Those that feed for shorter periods put up cattle in higher condition, called 'short keep' feeders, feed heavily from the start and turn off at Christmas or other favourable season. The cattle thus turned off are usually very good and are always in demand at the top prevailing price. Those that hold stock for 200 days or more have good pasture farms which they graze down by midsummer when the cattle are sold. As a rule such pasture, is not again grazed until the following spring when it is early ready to support a good stock of animals. According to the evidence of the feeders consulted there is profit in all of these systems according to the localities, management, etc. In sections where the soil is light and therefore subject to dry out in summer, finishing on pasture does not succeed. In such districts both clover and ensilage corn are usually easily grown and these with grain are favourable for wintering fattening. In other sections, notably in Middlesex, Lambton and Huron much land is admirably adapted to grazing. Here is where a large number of the summer exporters are produced. This system requires comparatively little labour as the feeders are usually purchased and the land requires no cultivation. The feeders of short keeps are careful to select choice stock at seasons to have them finished to catch the best markets. They adopt intensive methods learned by specializing and in this way secure the greatest gains for the food consumed and having superior beeves secure the highest prices going. Unless one has a large amount of

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experience or a specially good pasture farm the middle course is safest as the coarse fodders are transferred into a valuable marketable product, a large amount of fertilizer is secured to keep up the land and the cattle go away before the busy season in the fields and before the dry fodder becomes unpalatable and the roots exhausted. The market at this season is invariably good, more especially for the export trade.

Housing.

The ideas of feeders in regard to housing have changed materially in recent years. It is not long since the 'bank barn' was looked upon as the ideal quarter for the fattening steer. Warmth was the chief consideration and comparative darkness was not objected to. Undoubtedly good cattle have come out of these old fashioned cellar-like stables, but the progressive feeder has abandoned these dingy houses for more sanitary quarters where pure air and sunlight can enter and where the animals may be cared for in comfort. All progressive feeders now concede that the airy light stable is a necessity, the unsettled question being tying versus feeding loose.

The feeding of grown cattle loose in pens commenced to receive attention in Canada in the early nineties. About that time the feasibility of removing the horns became generally accepted. Having accomplished this, one of the great barriers to loose feeding was overcome. Then the securing of farm labour became a difficulty and having taken off the horns the next step was to remove the stalls and ties and adopt the long trough and rack. Both the Dominion and Provincial Experimental Farms carried on comparative tests and proved conclusively that loose feeding has the advantage both in gains from food consumed and in labour in caring for the animals. On this point, J. H. Grisdale, of the Experimental Farm says: 'Loose feeding is more advantageous because results have been uniformly more profitable everything considered.' Prof. G. E. Day, of the Ontario Agricultural College says: 'Our experience leads us to believe that it is more profitable to feed steers loose than to tie them in stalls. Loose steers are less easily surfeited, are less likely to become crippled or sore in their feet, and appear to shrink less on the way to market.'

The opinion of extensive feeders for the export trade is not uniform. Those who put off short keeps that are hastened to a finished condition seem to prefer stall feeding. Those who feed from five to six months, disposing of their cattle in April or May, are about equally divided in opinion. Those who carry their stock over to July or August on grass almost to a man pronounce in favour of loose feeding.

By tying the cattle individual attention can be given to the requirements of each animal. For this reason it is preferred by men who have thoroughly competent herdsmen and endeavour to secure superior uniform finish for a high market. On the other hand feeding may be done in loose pens by less competent men, as one requires only to know what each pen needs, rather than each individual. Then when the cattle are taking exercise they are less liable to suffer from inaccurate feeding.

Undoubtedly for cattle that are to graze the loose system of winter feeding has the advantage. The animals are always keen for their feed at feeding time and therefore consume and appropriate copious meals of cheap fodder. This with a small grain ration gives cheap gains and a generally thrifty condition. The digestive organs are invariably maintained in the best possible form so that when pasturing is commenced large quantities of food are eaten and quickly converted into beef. One experienced feeder states that if he were building new or overhauling old stables he would not put in stalls but construct long rows of mangers with stanchions that could be opened or closed from one end. By this means the cattle could if desired be fastened for an hour or two while feeding or be left tied continuously. This would make possible a compromise system adaptable for cattle of different sizes and for a varied system of feeding.

There is but one opinion held in regard to the economy of labour in the loose system. The food for a dozen or more head is as readily distributed as for three or four animals standing in stalls. Then the cleaning out and bed-making

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twice or oftener each day gives place to the much simpler and easier system of bedding twice a week and removing the manure even less frequently by wagon, cart or sleigh, and applying it direct to the land. Objection is taken to the loose housing on account of the larger amount of straw required to keep the animals clean and dry. On small farms where the acreage of grain grown is small this argument undoubtedly has force, but where straw is not scarce no better means can be found of converting it into the best quality of manure. Some feeders use very little bedding even with loose feeding and claim to see no objection to having the animals dirty. If cattle are to do well it is undoubtedly important that they be comfortable and if they are to bring their full value on the market they must present a clean and attractive appearance. It therefore pays well to provide cattle with a dry bed of straw or other absorbent material.

Feeders differ in their views as regards the number that should run together. Some say 5 or 6 is enough, others 10 or 15, while others run the whole lot together, even up to 30 or more head. Unless abundance of space is provided for all the animals to get to the trough without crowding, care should be taken to have them graded. It is sometimes necessary to select out the less vigorous or cowardly ones to be tied up or fed in a separate pen.

Mr. George P. Barrie, of Galt, Ont., who has been feeding loose for some ten years has a system that is worthy of description on account of its simplicity. The shed, beneath a barn 40 by 80 feet accommodates 30 head of steers. It has open racks against the walls into which long fodder is fed from above. It has also a feed bunk or manger 4 ft. 6 in. wide running down the centre of the shed, leaving about 12 feet at either end for a team and wagon to pass when hauling out the manure. Over the centre of the feed bunk running lengthwise is a wooden car track which leads into a feed room. On this a car large enough to contain feed for 30 cattle is suspended. The car when filled with ensilage, cut straw and chop, thoroughly mixed, is pushed along the track, over the bunk where the feed is distributed to the cattle in a few minutes. The amount of feeding space allows shy feeders to find a spot unmolested by the more vigorous cattle. The pen is bedded twice weekly with cut straw 4 to 6 inches long, and cleaned out once a week. The cattle when seen in March were as clean as grass cattle and appeared just as contented and happy. They have access to a trough of water in an open yard during the day and are closed in each night during the cold weather. Mr. Barrie regards feeding steers tied in stalls as a laborious and expensive method and not to be compared with his present system. The space given by Mr. Barrie (106 sq. ft. per head) is open to criticism if one had to build. A narrower building would answer as well, especially if an open yard is utilized during the day. A plan of Mr. Barrie's shed is shown on page 91.

The question of tying or feeding loose is after all largely a matter of convenience. To the man with a small herd it makes comparatively little difference, but for extensive feeding where a car load or more are on feed at a time, loose feeding is of great advantage. In the 'Corn Belt' and other feeding centres in the United States, the tying of feeding cattle as a general practice has long since been abandoned, being considered quite out of date ranking with the scythe and the cradle of the early days.

Most Profitable Age and Weights.

The days of the heavy bullock are past and the life of the steer is gradually shortening. The weighty ox will still command a good price, more especially for the export trade, provided he is of good beef formation and well fatted. Finish is what is looked for on the market and is as much appreciated in the butcher's bullock of 1,100 lbs. as in the exporter weighing 1,500 lbs. Most of the finished beeves marketed by up-to-date Ontario feeders are from 20 to 30 months old and weigh from 1,200 to 1,400 lbs. These weights suit the market and gains made up to the ages given are

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economically put on. Mr. Grisdale, at the Central Experimental Farm, found that three-year-olds made a daily gain of 1·65 lbs. at a cost of $6.52 per cwt.; two-year olds, 2·16 lbs. per day at a cost of $5.99 per cwt.; and yearlings, 2 lbs. per day at a cost of $4.30 per cwt. It therefore follows that the younger the animals are finished the less the outlay per pound of gain for food consumed.

Raising Versus Buying Feeders.

Undoubtedly the average Ontario and Quebec farmer who feeds a few head raises his own cattle, but there are coming to be more and more men who make a business of feeding depending on others to raise the stock. To such an extent is this the case that the trade in feeders at the Toronto market, more especially during a period each spring and fall, is about as large as in finished stock. Then many feeding cattle do not pass through the market but are picked up by feeders throughout the country. In reply to a question as to whether it is preferable to raise or purchase feeders an experienced fattener replied: 'It is more satisfactory to raise, but more profitable to buy one's supply.' Much depends on one's land and his system of farming. In sections subject to drought, more especially on high priced land, it is well to have few cattle on hand during the summer months. To carry a full stock of all ages under such circumstances one must resort to some system of soiling in order to keep up the condition of stock. This is expensive and often otherwise unsatisfactory. By depending largely on buying one can purchase according to his supply of fodder and thus avoid loss by either over or under stocking. One extensive feeder who turns off cattle at two or more seasons says:—'Buying is more satisfactory to me as I can turn money over faster than if I raise my stock. I know what feed I have and can fill my stable accordingly. In this way I am never over-stocked and do not have to sacrifice for want of feed. I can buy steers 24 to 30 months old cheaper than I can raise them.'

Breeds and Grades.

The bulk of the good steers raised in Ontario and Quebec are Shorthorn grades. There are also a good number of grades of other beef breeds. Most of those who have given the different breeds a fair trial like one as well as another. One feeder prefers Shorthorns for stall feeding and Herefords for grazing. Shorthorns are said to be more docile than the others. An extensive feeder speaks a good word for the Aberdeen-Angus. He says: 'I get good cattle among all the beef breeds and crosses, but have had best results from the Aberdeen-Angus and grades of this breed. They are more uniform, have better constitution, eat more rough feed and do well on it, then they require no dehorning.'

Selection of Feeders.

Much of the success in feeding purchased stock depends upon the selection of the animals. Even the most skilful management and best of feed cannot make profit out of badly selected steers. When one has raised his own steers from good breeding stock he knows how to treat them for best advantage and what to expect, but a keen eye and good judgment are necessary to enable one to select strange stock that will make profit in the fattening. One will judge from his proposed plans whether he should buy thin cattle or half fat 'short keeps.' Well grown half fat bullocks are usually more profitable to buy in spring to go off grass in July or August. If they have not been heavily grain fed such cattle will usually gain rapidly on good grass, going out 200 lbs. or more heavier and worth from one to two cents per pound more than when purchased. For long period feeding thin steers are usually preferred, as they are more cheaply purchased, and one has more opportunity to control their progress. In any case it pays to select growthy animals of good beef type showing strongly the blood of one or other of the beef breeds. It is advantageous that they be as nearly uniform in colour as possible as then they present the best appearance

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when fat. A wise feeder remarked that: 'One sells his cattle when he buys them.' The good ones are always in demand, and with those up to a certain point, the seller can dictate his own price. Poor ones known as 'tail enders' are invariably a disappointment and a loss to all who touch them.

In general form the select feeder is low set, deep, broad and compact. Their top and underlines should be straight and nearly parallel. One should look for as much smoothness as is consistent with thinness. Too great prominence of shoulder, hips and tail-head should be avoided as should rough, coarse heads set with small, dull eyes. A good feeder possesses a short, broad head and short thick neck and short legs. A large prominent and bright but mild eye is very desirable as it indicates vigour, as well as quietness of disposition and these are both essential to well doing. The lower jaw should be heavily muscled and the muzzle, lips and mouth large without coarseness.

It is important that a feeder possesses that characteristic difficult to describe known as quality. This is of two kinds, general and handling. The former is closely allied to breeding and is quickly discerned by the trained eye. Good handling quality indicates thrift which is dependent upon good health and general vigour. It shows itself in a mellow but moderately thick and loose skin, a thick and soft coat of hair of medium fineness. A steer that possesses the qualifications already described will almost assuredly have a vigorous constitution. It is well, however, to see to it that he has a wide deep chest, fulness in heart girth and good spring of rib. Such feeders as have been described are not the most plentifully offered but in buying one should secure the best available at the price one feels justified in paying. Buyers who purchase throughout the country from year to year soon learn to avoid the special dairying districts and to stick closely to those where the high-class pure bred beef bull is generally used and appreciated.

An experienced feeder, who turns out specially good cattle, receiving the top price for them says: 'Good cattle, to finish properly and profitably, is the great want in Ontario these years. Good ones pay well to feed but the majority of those marketed never pay for the feed used. A poorly bred 1,000 pound steer bought at 3 cents per lb., with 300 pounds added and sold at 4 cents, gives $22 for feeding. The good quality steer of 1,000 pounds, bought at 5 cents, increased in weight 300 pounds and sold at 6 cents, gives a return of $28 for the feed used. Summing up the two steers, each started at the same weight, each increased the same number of pounds and sold at the same increase of price, viz.: one dollar per 100 pounds gives a return of $22 for the low quality animal against $28 for the high priced steer. In a stable of 20 cattle this would make a difference of $120 more margin of profit in favour of the good ones. Surely the seller of the $30 steer would have to rest content with probably no profit while the $50 stocker would give a handsome profit to the grower. It is the well-bred early maturing bullock we must have in order to make feeding profitable.'

The Buying and Selling Margin.

One has to be careful not to pay too much for his feeders. A number of buyers claim $1 per cwt. less than the selling price will give a profit, others say $1.25, and still others $2 per cwt. is necessary. Much depends on the condition of the cattle and the time they are to be fed. On a thin steer weighing 1,000 to 1,100 lbs., requiring 150 to 180 days to finish, the lowest margin should be about $1.50 per cwt.; a fatter animal of the same weight to be kept only 100 days, a margin of $1 per cwt. would be a fair return, while if he is to be held two months or less, 75 cents per cwt, would give a profit. One extensive feeder says: 'I usually pay $3.50 per cwt. in October for cattle I expect to sell in spring at about $5.50 per cwt. Another pays $4 per cwt. in the fall for 1,000 lb. bullocks that he expects to sell for $5 the following June. This feeder gets the advantage of cheap gains on grass following a winter of moderately light feeding. Another feeder estimates that one should get at least 25 cents per cwt.

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per month advance over the purchasing price. Some of these margins may seem little but it must be borne in mind that one gets the advance not only on the gains made but on the original weight of the bullock as well.

Gains Made by Fattening Cattle.

A large number of feeders consulted secure gains of from 1½ to 2 lbs. per day per head during the winter and a little more in summer. One feeder says: 'A bunch of steers should make an average gain of 50 lbs. a month. Some will do better and some not so well, but the lot should average 300 lbs. heavier than when weighed in after having been fed six months.' This is for winter feeding. A grass feeder says: 'Cattle in very good condition, put on grass in May and sold in July, will have gained from 1½ to 2 lbs. per day according to the season. On thinner cattle we can easily get a gain of 2 lbs. per day on good grass during the summer with the exception of the very hot weather in August and beginning of September. Another feeder feeds his cattle to gain 150 to 200 lbs. through the winter and 150 lbs. on grass. This man feeds meal on the grass to those shipped out early in the summer.

Methods of Feeding and Rations Used.

To get the most out of one's feed and cattle requires more than the application of rules, no matter how good these may be. A veteran feeder puts it thus: 'No man will ever be a successful feeder unless he takes 'brains' into the stable with him. Regularity in feeding, kindness and pains-taking attention are amongst the most important factors of feeding.' The animals must be comfortable at all times. This involves not only comfortable quarters, but no inconvenience at any time from indigestion or other unnatural conditions. They must come to each meal with a keen appetite and go away from an empty trough satisfied. (An exception to this is where self feeders are used.)

In the early stages light feeding should be the rule, more especially in regard to the grain ration. There is possibly no better preparation for a season of fattening than a run on rape for a few weeks preparatory to housing. This food tones up the system and puts the digestive organs in fine condition. The good gains commenced on the rape are with careful feeding likely to continue. Two months on rape with heavy feeding in the stalls for forty days is one feeder's system of preparing well finished Christmas beeves. Those who feed all winter find it advantageous to start off with a very light grain ration and this mostly bran. Great importance is attached to succulence in the roughage ration. This is necessary to maintain the digestive organs in good condition. One highly successful feeder, who houses his cattle about the middle of November commences at once to feed ensilage, cut straw, grain chop, and clover hay. Each animal gets during the day a mixture of 25 lbs. of ensilage, 6 to 7 lbs. of cut straw, and 1½ lbs. of chop. These foods are mixed in the morning for the day, with a small quantity of salt added. As much clover hay is given as is eaten up clean. The meal ration is very gradually increased up to 8 or 9 lbs. to the animals being finished in the stable. Clover hay is substituted for the cut straw towards the finishing period and the quantity of ensilage is reduced towards the end. The mixture of grain consists of bran and shorts and a mixture of oats, barley, peas and goose wheat grown and ground together. The finishing cattle get from 1 to 4 lbs. of oil cake per day towards the end.

A feeder who does not use ensilage feeds cut straw, corn fodder, mixed grain chop, pulped roots and a little salt, all dampened and mixed 12 to 24 hours ahead.

One who depends on roots for his succulent ration commences on cut hay, turnips and a light meal ration. The meal is gradually increased up to 8 or 10 lbs. per day according to the size of the animal. The roots are liberally fed up to 40 lbs. per day.

A feeder who reports rapid gains mixes corn silage, pulped roots, chaff and cut hay, enough for two meals. This mixture is fed twice daily with chop thrown over it in the manger. Each animal gets 25 to 30 lbs. of ensilage and 12 lbs. of roots.

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Enough of the chaff and cut hay is added to fill them up. The grain ration is commenced at the rate of 2 lbs. per day and increased to 8 lbs. towards the finishing period. Clover hay is fed whole once daily. Another feeder who uses practically the same foods does not give the meal rations until the coarse mixture is half eaten. This he believes induces fuller meals. The liberal feeding of ensilage and roots sometimes induces an over laxative condition. To counteract this, feeders find it advantageous to use cotton seed meal as a portion of the grain ration. From one to two pounds per day is usually fed for this purpose. Cotton seed meal is a highly concentrated food possessing valuable feeding qualities.

Mr. J. H. Grisdale at the Central Experimental Farm, in several years experience in fattening cattle has found the following foods and system of feeding most profitable. The roughage mixture consists of ensilage, roots, straw and hay. These with the exception of the hay (clover) are mixed together a few hours before feeding. The proportions for each animal per day are about: ensilage, 40 lbs.; roots, 15 lbs.; cut straw, 4 to 5 lbs.; and long clover hay, 4 lbs. The meal ration is fed as follows:—

1st and 2nd weeks, none.
3rd week, 1 lb. bran.
4th week, 2 lbs., chiefly bran.
5th and 6th weeks, 3 lbs., consisting of bran, 2 parts; and oil-cake or gluten meal, 1 part by weight.
7th, 8th and 9th weeks, 4 lbs. above mixture in equal parts.
10th, 11th and 12th weeks, 5 lbs. above mixture, bran, 1 part; oil-cake or gluten meal, 2 parts.

It will thus be seen that the roughage ration is constant, while the meal ration is light and cheap in the early stages and gradually increased both in quantity and richness. Cattle fed in this way appropriate the maximum of food consumed.

The above systems are for cattle being finished for the winter and spring trade. Cattle to be finished on grass are fed in practically the same manner in so far as the rough foods are concerned. The grain ration, however, seldom or never goes above 3 lbs. per day unless in the case of heavy cattle to receive a grain ration on the grass. Then grain may be fed more heavily during the winter and spring months without risk of loss owing to the change from dry feed to pasture.

Buying Food for Fattening.

It is the consensus of opinion of experienced feeders that it is not profitable to purchase coarse fodder. A few consider it practicable to purchase hay if necessary, if it can be bought at not more than $6 per ton. As a rule feeders put up no more cattle than they have home grown fodder to supply.

Most feeders object to buying grain unless it can be purchased at not more than $1 per cwt. They endeavour to raise all their grain foods as well as their coarse fodder. As a rule those who buy concentrated food select those sorts that give variety or balance to the ration. One feeder buys bran and oil cake to mix with such heavy feeds as barley or corn. Another buys corn when he can lay it down on his farm as cheaply as Canadian coarse grains. A number find it profitable to purchase oil cake, cotton seed meal or gluten meal, and corn to mix with such home grown feeds as oats, barley and peas. The oilcake, cotton seed meal and gluten are used more particularly during the final three or four weeks of the finishing period.

Home Grown Grains.

It is customary for many feeders to grow feed grains in mixtures. It is claimed that larger yields are secured and the grain is mixed ready for grinding. The report of the Bureau of Industries for Ontario shows that almost half a million acres of mixed feed grains were grown in the province in 1908. According to experiments

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conducted by Prof. C. A. Zavitz, of the Ontario Agricultural College the highest yields of grain per acre in the average of the two years 1907 and 1908 were produced from a seeding of 4 pecks of oats and 4 pecks of barley per acre. For the best results a comparatively late ripening barley such as Mandscheuri and an early sort of oats such as Banner should be selected. These are both good yielders. In earlier years different mixtures were tested. In the average of four years a mixture consisting of oats, 34 lbs.; barley, 72 lbs. and flax 28 lbs. per acre gave the heaviest yield per acre. The same quantities of oats and barley with 30 lbs. of spring wheat instead of the flax gave a heavy crop. A successful cattle feeder and first-class farmer sows the following mixture per acre: oats, 6 pecks; barley, 2 pecks; goose wheat, 1 peck; peas, 1 gallon; and flax, 4 lbs. The flax seed must not be buried as deeply as the grain. Peas and oats and oats and barley are profitable mixtures, while oats, barley and goose wheat find favour on many farms.

Roots Versus Ensilage.

Almost every feeder consulted prefers ensilage to roots while a large proportion consider a mixture of the two preferable to either alone. Corn is considered a much surer crop and it will give more cattle feed per acre than any other crop that is grown. It is also most economically produced from the standpoint of labour. One feeder says: 'Once in a silo it is like a bank account to draw from all winter long with no labour to prepare it for feeding.' Another, who expresses the view of many, put it thus: 'Corn ensilage is decidedly the better, considering labour and yield. I, however, value turnips highly, and although they cost more than corn ensilage no feeder can afford to be without them.' A user of both foods says he prefers the mixture because cattle do not go wrong as often with some roots as when fed on ensilage with dry fodder and grain without them. In addition to the food value of roots they have a peculiarly salutary effect upon the digestive system. In a less degree corn ensilage performs the same office although cases of indigestion are believed to have been caused by this latter food when not properly cured. Roots on the other hand when fed in reasonable quantity and in sound condition tend to correct any little derangement that may have been caused by other foods. Roots are especially valuable for young stock, whereas ensilage should be fed only in very limited quantities to animals under a year old.

Systems of Watering.

An increasing number of feeders are each year installing watering systems whereby cattle have constantly before them a supply of fresh water so that they may drink as frequently as they wish. If one is to follow nature this is the ideal system, as undoubtedly an animal's thirst is its guide as to when it requires water. No reports of experiments touching this question in regard to fattening cattle are available. Experiments with milch cows showed that those having free access to water gave at the rate of 225 lbs. more milk annually than cows watered twice daily. Most of the feeders in loose pens have watering troughs in one corner of the pen and many of those who feed tied have either individual drinking basins or a trough running through the stable along in front of each row of cattle. Others, who allow the stock access to an open yard, or turn them out once or twice each day to drink, have troughs in sheltered places in the yard. A number who have this plan intend to install indoor systems at an early date. Those who have water constantly available indoors claim that the temperature is moderate and large quantities are never drank at once. A few of those who turn out tied cattle to water in a yard claim that the animals are benefited by a short period of exercising in the open air. It sometimes happens, however, that one or more animals will be again housed without a drink and will suffer from thirst before the next watering time when too much is apt to be taken. Cattle that are receiving a liberal ration of turnips require comparatively little water and will do nicely on one drink daily, while those getting ensilage or dry food and no roots

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require water twice. A steer receiving up to six pecks of turnips daily is getting about 80 lbs. of fluid from this food alone and will do very well without drinking, more especially during the cold weather. Some animals tied, with water constantly before them, acquire the habit of lapping or sipping water much of the time. These are apt to take too much and suffer from scours. Such cattle should be deprived of the privilege of a constant water supply by either covering the basin, except at proper intervals, or housing them in another quarter. Whatever system of watering is adopted it is important that the animals drink comfortably whenever they need water and before any suffering from thirst is experienced. A system that does this with the least labour is likely to be satisfactory.

FATTENING IN THE MARITIME PROVINCES.

The production of beef in the maritime provinces is carried on to only a limited extent. Dairying is found to be more profitable, and for this reason the dairy breeds greatly predominate. Very little fattening on grass is done, although many cattle marketed from the pasture alone go direct to the butcher, but they are not fat. The bulk of the fattened cattle go off for the Easter or late May markets as the prices are usually highest at these seasons and the system of fattening suits this also.

Almost all feeders tie their cattle. A few favour loose feeding, if straw were plentiful, but it is usually scarce.

Very few feed off two-year-olds and a number who report their experience give 1,200 to 1,300 lbs. as the weight of finished three-year-olds. One feeder prefers in buying to select steers rising four to sell at an average weight of 1,500 lbs. It would seem as though the cost of production is not given serious study. The lessons of Ontario feeders on this point may be useful to feeders in the eastern provinces.

Very few have a good word to say for buying feeders. Those offered for sale, it is claimed, are usually badly bred and stunted in growth. One advanced Nova Scotia feeder says: 'In most cases I raise my own steers which are bred from beef strains of cows. These are well fed from calves and invariably mature early then fatten with 30 per cent less feed than purchased cattle and in a shorter period.' One Island feeder who raises his own stock raises two calves on one cow. As a rule steers that are bought to fatten have to be carried on to four-year-olds in order to get good carcases.

Grades of all breeds are said to be fed for beef in the maritime provinces. Most feeders recommend Shorthorn but a small number express a preference for Devon blood which is claimed gives smoothness and early maturity. These are said also to show greatest gains on spare pasture. A good word is spoken for Ayrshire grades which are invariably hearty feeders. Herefords and Aberdeen-Angus give satisfaction where used.

Replies in regard to the margin between buying and selling indicate that very little close figuring is done. Those consulted expect to get twice as much in the spring as was paid for the animals in the fall. One man says he usually pays $20 for animals he sells for $50 after six months feeding. Those who buy and sell by weight claim that from 1¼ to 3 cents per pound of margin is necessary to make a profit. Much depends on the character of the stock. Gains on a fattening ration vary from 1½ to 3 lbs. per day, the majority reporting about 2 lbs. per day.

The maritime feeder does not, except in few instances, grow ensilage, but depends on roots for his succulent ration. Hay, roots and mixed chop is the usual ration used. The most successful feeders give hay and turnips until about the end of January then a light grain ration which is gradually increased until the limit of profitable feeding is reached. Hay is fed to the extent of satisfaction, roots up to 60 lbs. per day, and grain commencing at one pound and reaching 8 lbs. or in some cases 10 lbs. per day. At the Nappan Experimental Farm the best results have been obtained from the following method of feeding: For a month to six weeks each animal

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gets 60 lbs. of roots, about one pound of chop and clover hay with a small quantity of straw per day. The chop is gradually increased and roots or ensilage decreased until it is getting each day 7 to 8 lbs. of chop and 15 to 20 lbs. of roots or ensilage.

As a rule geef cannot be profitably fattened in the maritime provinces on purchased feed. Most feeders produce their own although a few buy oilcake to help out the ration. A small number of feeders, farming light land, find it pays to buy grain for feeding in order to get cheap fertilizer. Mixtures of barley and oats are chiefly used although some use peas. At the Nappan farm, barley, oats and peas are mixed and grown together for cattle food. Clover hay and good oat straw comprise the favoured coarse fodder. Roots are preferred to ensilage because the former crop is more certain. It is claimed to be as easy to grow 30 tons of roots as 20 tons of corn per acre with little difference in labour.

Many feeders who use roots liberally do not water their cattle. A few have water before the animals in the stable and like it. The rule is to water once daily during cold weather and twice daily afterwards at a trough outside. Maritime feeders may profit from a study of the methods employed in Ontario and Quebec as described in earlier pages.

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BABY BEEF.

While baby beef is not a quoted commodity in Canadian beef market reports, a certain amount of quite young well finished beef is sold in the largest cities each year. It is not for lack of appreciation of baby beef that the market does not call out for it nor set a price upon it, but for the reason that the supply is too small as to make little or no impression. Interviewed regarding baby beef one of the largest meat handling companies in Eastern Canada stated that the supply of such cattle is confined very largely to the Christmas and Easter markets. The term 'baby beef' applies to bullocks or heifers ranging from 18 to 22 months old and weighing from 900 to 1,100 lbs. Such cattle being well fatted, dress out from 58 to 60 per cent of carcass of the finest quality of beef, being juicy, tender, and of excellent flavour. The consumer who gets a roast or steak from such a carcass usually comes back for another prepared to pay a premium to get it, but the supply is exhausted, so that no regular trade in 'baby beef' is allowed to develop. Cattle such as described bring an advance of from 60 cents to $1 per cwt. at holiday seasons and from 40 to 50 cents per cwt. at other seasons of the year. It is worth the latter advance on account of the high dressing percentage and the larger premium because of the superiority of the meat. The firm referred to would be glad to handle from 60 to 100 such cattle per week throughout the year for Toronto alone and pay a half dollar premium for it over the regular market price of No. 1 butcher's cattle.

In the United States the production of 'baby beef' is growing into an extensive branch of the cattle industry. There, well bred calves are bought by feeders and fed on a full fattening ration for about twelve months, when they are ripe for the trade. In Canada the few that are sold are fattened on the farms where bred. They are usually reared on their dams, never allowed to lose their calf flesh and receive a grain ration continuously through life. Two requirements are necessary in the making of baby beef—well bred breeding stock and liberal, judicious feeding. Without the former, thickness of flesh in the best parts cannot be obtained, and without the latter, proper finish on such young animals is impossible.

It has been proved again and again that gains are most cheaply made in young animals. An experienced feeder of baby beeves puts it thus: 'Two calves will eat no more concentrated food than one big steer and make double the gain. A feeder will do well to put 600 lbs. on a 1,000 lb. steer in a year while two well bred lusty calves, properly fed, can easily be made to gain 1,600 lbs. in the same time at no greater cost.' He figures that if a calf costs $25 and the big steer $50 at the start, he is one fat animal to the good at marketing time. Any two young animals will give better returns for their food than one approaching maturity and this applies to cattle, hogs or sheep. This does not mean, however, that high finish in baby beeves is secured at little expense. The tendency in calves and yearlings is to grow rather than fatten, so that fattening is accomplished only at the expense of generous feeding. A certain proportion of rough fodder is necessary to develop the digestive power of the animals and this should be of good quality. The ration must in the main be rich and well balanced. Probably the best rough fodder that can be fed is clover or alfalfa hay and silage in winter with abundant pasture or soiling crop in summer. Chopped oats is safe feed and tends to develop thriftiness, but to this should be added such foods as corn or pea chop, oil-cake, cotton seed meal or gluten meal, the latter heavier meals being increased in proportion to the lighter as the finishing approaches. When turned on pasture the grain ration may be decreased while the grass is abundant but it seldom pays to discontinue it no matter how good the pasture. Heavy weights are not

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desired or advantageous but it is hardly possible to make yearlings too fat for the market. As a rule heifers fatten more rapidly than steers and can therefore be got ready earlier.

Considerable experimental work on baby beef production has been done by J. H. Grisdale, at the Central Experimental Farm. This work has been carried on each winter for a number of years chiefly with a view to ascertaining whether it is more profitable to rear beef cattle on a relatively poor ration or push them along on good feed right through their lives. Calves of grade Shorthorn cows calved in May, 1906, were fed on a comparatively heavy ration for 627 days or about one year and nine months. During this period each animal gained 937 lbs., which when added to the original weight 113½ lbs., made 1,052½ lbs. each. The cost of gain was figured out to be $4.63 per 100 lbs. These cattle were not allowed to pasture but had all their food taken to them. Nor were they allowed to suck their dams. Following is the kind and quantity of food eaten by each animal in the group:—

Oats, 559 lbs.; bran, 893 lbs.; gluten, 154½ lbs.; barley, 159 lbs.; corn, 131 lbs.; oil meal, 202 lbs.; ensilage and roots, 13,923 lbs.; hay, 956 lbs.; skim milk, 1,719 lbs.; and green clover, 163 lbs.

Not having access to a market where baby beef was appreciated they sold for only $50 each, but the buyer found such satisfaction in handling them that he would gladly have given a higher price for more of the same kind.

Owing to interruption in the feeding of the above lot of cattle, due to the overhauling of the barns, the gains were lower and the profit less than with previously fed lots. The groups fed off the previous year made better returns. Calves dropped in the spring of 1905 were fed on a full ration for 414 days, being sold at less than 15 months old. At the commencement of the experiment the weight of each calf was 159 lbs., and cost five dollars. At the end an average gain of 758 lbs. had been made, bringing the total weight up to 917 lbs. The cost of gain was found to be $3.84 per 100 lbs., which was 79 cents per 100 lbs. less than the group fed the following year and held six months longer. As in the above case the cattle were hand fed right through. The cattle sold at $5.25 per cwt., less 4 per cent, leaving a profit, over original cost and value of food, of $12.10 per head. The food consumed by each animal was as follows:—

Oats, 396 lbs.; bran, 95 lbs.; barley, 57½ lbs.; corn, 2 lbs.; oil-cake, 168 lbs.; gluten meal, 47 lbs.; ensilage and roots, 8,443 lbs.; hay, 1,095 lbs.; skim milk, 2,270 lbs. The cost of this food was estimated at market values to be $29.20.

Prof. Day has produced at the Ontario Agricultural College some excellent specimens of baby beef. They were reared and fed as object lessons for short course students rather than to ascertain the economy of producing such animals. For the Eastern market, 1908, he sold a small shipment at 7 cents per pound alive, which was fully a cent per pound higher than the highest published market quotation. If an advance of one cent per pound for baby beef over the general run of No. 1 butchers' cattle could be depended upon at all seasons of the year there is no doubt the production of this class of cattle would become more general, but the indications are that prime baby beef, like hot house lamb and other delicacies, will be produced by a few people who have the class of stock, skill and inclination to turn out a special class of product to meet the demands of a special trade. There is, however, a growing tendency to market cattle younger than formerly. The demand for such is strong even when in good but not extra fat condition. There can be no doubt in the case of calves which a feeder raises himself, it pays to keep them going getting them upon the market in the shortest possible time. It is not difficult to make yearlings that have been reared as calves on skim milk with adjuncts desirable to the market at 15 to 16 months old. Well fed stock of this age weighing up to 800 lbs. will bring as much per pound as older cattle that have cost considerable more in their lives for food simply of support. There is no doubt a better profit is realized by getting the finished steer off at this age than if he is dragged along in a half starved condition over another

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winter and fed off as a two-year-old. Such cattle need not command a premium over older steers to make a good profit provided they have been handled with judgment. These young animals make cheaper gains, and where the breeding is satisfactory there is little doubt that they will find many eager buyers. This applies particularly to the fattening of animals of one's own raising with such there can be only loss in semi-starvation. In the case of steers purchased for feeding it is not as a rule advisable to buy calves because frequently those offered are not well bred, and often they have not been well started in life. In buying there is less risk in depending upon heavier steers, the condition and breeding of which can be more easily estimated and on which the raiser has already experienced all the loss that is necessary.

The making of 'baby beef' in its highest form may be looked upon as somewhat of a special line requiring not only the knowledge of a well informed cattle man to breed or select the calves but the skill of a clever feeder to secure continuous gains from calfhood to beef. Unless the calves selected are of the thick, well bred kind possessing a natural tendency to fatten they are not likely to finish profitably under two years old. Unless the feeder is able to so gauge the feeding so as to insure constant growth as well as fattening he may not be able to secure gains in keeping with the daily outlay of heavy feeding necessary in the making of finished beef at 18 to 20 months old. Unless thick, fleshy, lusty, well bred calves are procurable or unless the cattle can be placed in charge of a skillful feeder it is perhaps safer to adhere to the middle course of aiming to get the finished steers away at from 24 to 30 months of age. To defer the finishing beyond this age on a farm where mixed agriculture is practised is to reduce the profits accordingly unless the cattle are to be purchased and may be secured at a comparatively low price.

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VEAL.

While veal can hardly be classed as a standard flesh food along with beef, pork and mutton, it occupies an important position in the meat markets of villages, towns and cities. The veal season is chiefly confined to the spring months although a considerable amount of it is consumed at all seasons of the year. Veal is very largely the product of dairy farms and the major portion of it sold consists of the calves of herds kept for the production of milk.

The statistics of the stockyards of Montreal and Toronto show that 90,000 calves were marketed at these two principal distributing points during the year 1908, and about 110,000 during 1909; the receipts at Montreal each year being practically double those at Toronto. Statistics further show that about 60 per cent were received during the four months commencing on March 1. For Montreal alone the proportion for these months was considerably higher than 60 per cent which is accounted for by the proximity of that market to a large territory where dairying is the prevailing agricultural industry. Taking Toronto alone, the receipts for the four months named include about 50 per cent of the year's supply. It is unfortunately true that a large proportion of the spring calves received, more especially at Montreal, but also to some extent in Toronto, are of exceedingly poor quality. Before the advent of federal inspection in 1907 very large numbers brought in were less than one week old and a certain proportion of these still find their way to the market to meet confiscation or be disposed of through local uninspected slaughter houses.

Of the calves, three weeks and over, which make up the great bulk of the offerings there are several classes ranging from prime veal to very inferior stock. The stretch of quotations in the market reports, especially during the spring months, indicates the range of quality. From two to ten dollars per head or from six to nine dollars per cwt. are common quotations and tell a striking story.

Veal may be roughly classed as heavy, prime and common. Heavy calves may again be subdivided into fat and rough. While the former bring a better price per pound than the latter they are by no means as desirable to the trade as prime veal. A calf weighing more than 200 lbs. is not wanted by the butcher unless at special seasons of the year, such as Christmas or Easter, when a striking display in the shops is desired. Unless a calf is disposed of before it passes that weight it should be carried on for beef. Old or heavy veal not only cuts too large but is tough, coarse of grain and of bad colour, being too dark for veal and too pale for beef. This is why heavy calves are undesirable and cannot be sold at a profit. When prime veal calves are selling at $8 per cwt., even well fattened heavy ones bring about $5, and those thin in flesh correspondingly lower. These figures represent the relative values in Montreal and Toronto while in Chicago and Buffalo the difference in value is even greater. According to the figures of market authorities the proportion of prime veal to lighter calves is not more than from 5 to 10 per cent of the total receipts.

A Prime Veal.

A prime veal calf must have two qualifications. It must be between the ages of four and eight weeks and be well fattened. In addition it should carry a good depth of flesh on the back. This last named qualification is more a matter of breeding than fattening. That is to say a calf from a sire of a beef breed would yield a more fleshy carcass than one from a dairy bull. Of the ninety thousand or more calves received at the two leading markets of Canada the number of prime veals is comparatively small. Perhaps six per cent command a premium over the top quoted market price.

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The percentage of good calves, but not prime, probably reaches thirty per cent, leaving more than half inferior specimens unworthy of a place in a well provisioned butcher stall.

A good veal weighs from 100 to 200 lbs., a prime specimen ranging from 120 to 160 lbs. A well fattened veal calf dresses from 65 to 70 per cent with the skin on, in which condition it is usually sold. The meat is juicy, fat, finely grained, white and firm. The fat is firm and almost pure white. Prime veal properly prepared is a delicious article of diet and is at all times in demand.

It is important that one who attempts to raise veal understands how to judge when a calf is at its best. Its head should be comparatively small as compared with the body and have a sleek appearance. The neck or 'scrag' should be thick, brisket full, ribs well covered, loin wide, flanks full, points of rump plump and meaty, thighs plump and scrotum or udder full. It should have a generally firm touch all along the back, and a sleek mellow skin that will easily lift from the body. A calf with such points is ripe for the market, is sure to give a good carcass of veal, and if carefully moved and dressed is sure to cut up delicious, inviting, light coloured veal.

The Common Calf.

The common or inferior calf, that practically floods the market in the spring of the year is a scrawny specimen, carrying comparatively little flesh and that of inferior quality. The high price of milk in recent years gives many the impression that it is too valuable to feed to calves in its whole state, with the result that after the first few days the calves on many farms get little more than skim milk. They are then turned over to the first buyer who will take them at whatever price they will bring. Before the days of meat inspection, no calf was too young for the market, but the risk of confiscation has largely put a stop to the marketing of very young calves. While much of the 'bob' veal went into cans a large quantity was sold over the counters of meat shops marked in many cases at so low a price as to be readily taken by the poorer buyers. Then there is the skim milk calf perhaps old enough to be thoroughly wholesome but of such poor quality that the buyer is not likely to repeat his order for some time.

Inferior veal whether from very young calves or those insufficiently fed is a poor article of diet. In appearance the flesh has a bluish tinge while the fat presents a dull yellow appearance. It is unfortunate that it should be ever offered for sale under the guise of good veal. It is from eating such that veal has become to many a very undesirable food. True it is that cheap veal in the spring months is a blessing to many of the very poor in larger cities who are not able to pay the usual high prices for beef, pork and mutton prevailing at that season of the year. It is also true that if much of the lean veal sold were properly fattened the demand for it would greatly increase and this would at once enhance the value of good calves that would then assuredly pay for the milk and other food that would be necessary to fatten them. Since very young calves no longer pass inspection they must be fed for at least three weeks on something and unless this is good food a satisfactory price cannot be obtained for them. Calves weighing less than 100 lbs., unless fat, should not be marketed as they sell for a sharp discount. By feeding veal calves judiciously until weighing 120 or more pounds a satisfactory price is assured.

There is no doubt but that the consumption and consequently the demand for veal would increase rapidly if more good veal were offered. In Chicago, where federal inspection has been in operation sufficiently long to teach the consuming public that veal is good meat, the consumption of this meat has increased from 7 to 10 per cent. It is confidently believed that the illimitation of underweight calves is in large measure responsible for this. In Buffalo, practically the same condition of affairs exists. During a visit to the East Buffalo market in the spring of 1909 it was learned that fully 50 per cent of the calves marketed were fattened veals possessing more or less quality. In spite of large receipts this heavy supply of fine veals did not meet the

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demand, the price for such for several weeks being around $9 per cwt. live weight. In Canadian city markets high prices are almost always available for prime calves of right ages, dressing about 70 per cent but so few are offered that they do not figure in the regular offerings. Let the quality improve and there will be no difficulty in regard to the price which will pay well for the feed if judiciously provided.

The Toronto market consumes a large quantity of veal the year round. In the shops of one firm and the St. Lawrence market taken together the output runs from 1,000 to 4,000 carcases per month. The supply is lowest in December and January and highest in May, the increase and decrease being gradual between these periods. At all seasons, except April, May and June, good veals bring 10 cents and upwards per pound by the carcass. Values in Montreal for good calves are much the same, although the proportion of prime to inferior veals is much lower than those received at Toronto.

Division of the Carcass.

Veal like lamb and pork requires no maturing on the hooks. It should never be allowed to acquire the slightest taint as it renders it unwholesome and unpalatable. The hind quarters yield the choicest meat. The fillet, loin, leg, breast, shoulder and best part of the neck are the best for roasts. The neck, breast and knuckle are more usually stewed or boiled. The loin and ribs are cut into chops. The legs and ribs are made into cutlets. The lower part of the leg, or knuckle, is sold for soup pieces, stews, etc. A fillet of veal is the leg piece with the bone removed. The udder or firm white of the fillet is much used by French cooks instead of butter. The head and feet of the calf are valuable articles of food. The head should be sold with the hair taken off. The skin should have a healthy look, seem firmly attached; the eyes look bright and clear. If the head appears yellowish it is inferior and will bring a less price. In cleaning the head, care should be taken to remove the brains before scalding it. Calves' brains are a great delicacy. The feet are very rich in gelatinous substance. They should be scalded, scraped and made to look clean and nice, when they are ready for sale. Calves' haslet comprises the heart, liver and lights. Calves' tongues are considered fine, and always sell well.

Sweetbreads are the glands (pancretic) that assimilate the oily portions of the milk. They are located, one in the lower part of the throat and the other near the heart. The latter is the choicer, smaller and more nearly round. Sweetbreads are found in the young calf that is fed on the mother's milk until it has been turned out to grass, when they waste away, no longer being in use, or become tough, and lose their delicacy.

How to Fatten.

The natural diet of a calf is its mothers' milk in the whole state and undoubtedly the best veal is made at the udder. This system of fattening is expensive when the effect on the cow is considered. A lusty calf will undoubtedly drag a cow down in five or six weeks which will have an ill effect upon her production for the season. This is really the expensive part of making veal; by allowing the calf to suck the labour is reduced to a minimum and the top price for the animal is assured. Dairymen fortunate enough to secure city or condensery prices for milk cannot make veal production a regular business but with good management many factory patrons find the vealing of calves profitable. The milk of a 25 lb. per day cow for five weeks is worth about $8 at the factory. Deducting the labour of milking and hauling this is reduced to about $7. A well fatted calf at six weeks old, brings in average seasons, from $14 to $16, leaving a nice margin of profit for the veal.

To avoid injury to the cow for her season's milking the calf may be fed from the pail. By this method some of the cream may be saved by substitution. On no account should the veal calf be deprived of whole milk fed at the body temperature before it is three weeks old. At that age a pint of separated milk may be substituted for a like

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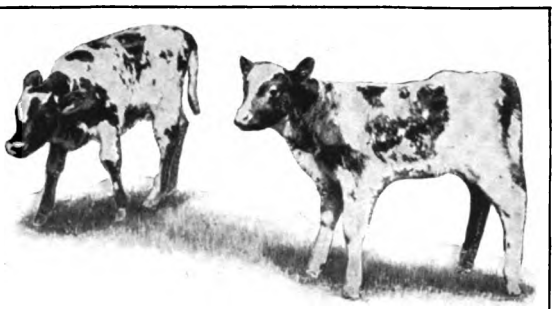

Fig. 32.
Calves four weeks old.

Fig. 33.
A Good Veal Calf.

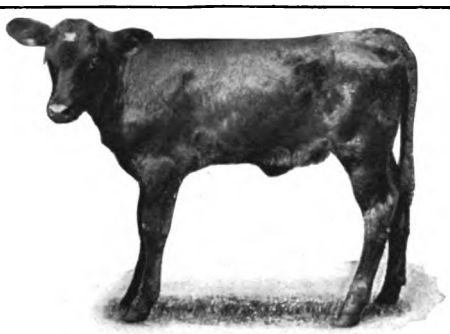

Fig. 34.
A Choice Veal Calf.

Fig. 35.
Inferior Calves.

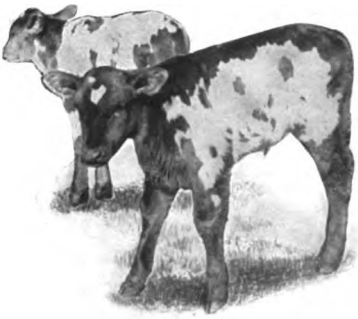

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Fig. 36. of Carcassf Prime Veal Calf. Total weight, 90 lbs ; skin, 8 lbs.; bone, 25 lbs.; meat 57 lbs. Meat of fine quality.

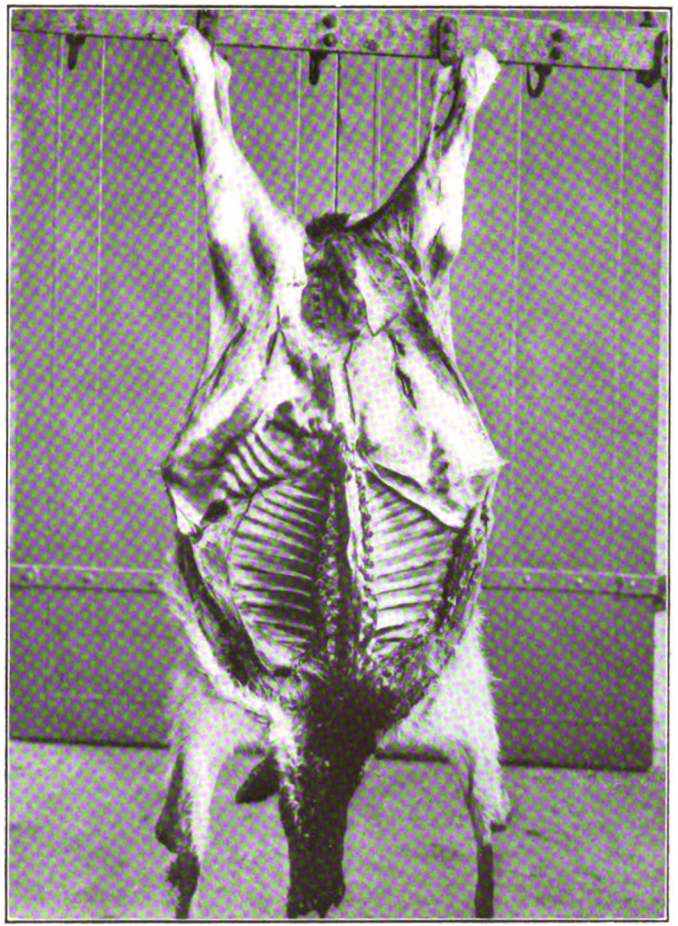

Fig. 37. Carcass of Common Veal Calf. Total weight, 55 lbs.; skin 6 lbs.; bone, 22 lbs.; meat, 27 lbs. Meat of inferior quality.

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quantity of the whole milk and to the mixture added a small quantity of flax seed jelly. For one calf a dessert spoonfull of flax seed is simmered—not boiled—in one pint of water until the mass becomes a jelly. This added to the milk constitutes an ecomonical substitute for the cream removed. From time to time at intervals of a few days the substitute may be increased until in six weeks the ration is not more than half whole milk. In all cases the food should be warm. Feeding should be done three times a day, and overfeeding carefully avoided. Experimenters have found profit in adding a tablespoonful of soluable blood meal to each feed of milk and flax jelly. The blood meal has a very favourable influence on digestion.

Very good veal calves may be made in four or five weeks. Under test a calf fed whole milk for four weeks made a total gain of 70 lbs. The calf thus fed should receive not over 16 lbs. of milk per day at the end of the fourth week of feeding. The experimenter concludes:—

'Probably a month is as long as it is advisable to feed calves on whole milk on a dairy farm, or until they have reached about 160 lbs. live weight or 96 lbs. of veal. This may be attained in a month, provided the calves are fatted as quickly as possible; but one cannot expect to do it unless the calves are fed three times a day. An effort should also be made to have the calves fat at a time veal commands a high price; otherwise the returns from vealing calves on whole milk may not be at all satisfactory.'

Some cow owners make a business of fattening calves for veal. Instead of milking, they buy, as they are able to do at very low prices, young calves from their neighbours. These they put on the cows until fat and when sold give place to others. This is continued throughout the season. A good cow will feed two calves at a time for a few weeks after calving and make good veals of them. As they are disposed of at four to six weeks old a comparatively small herd will fatten quite a large number of calves during a season. Such a system is hard on the cows and they require to be fed well to hold up in yield and condition. This method is peculiarly adapted for tough milkers, or those inclined to kick, either of which are available in almost every dairy district.

The Future of the Industry.

The veal industry of Canada offers great opportunities for development. Instead of being, as it largely is, a comparatively unimportant branch of the cattle trade it might easily be made a standard well established business. In all towns and cities more or less veal is consumed throughout the year but as a rule it is called for more as a very occasional change than as a more or less regular part of the diet. A very large percentage of people never touch veal in any form, regarding it an inferior class of meat. This is undoubtedly due to the poor class of calves usually sold for killing. One meal of ill conditioned or too young veal is enough to convince many a person that veal is not a desirable food, hence the very general disfavour in which it is held. Federal or municipal inspection is already accomplishing much in Canada, as it has in the United States, in eliminating the unfit calf, more especially of the younger class, but calf raisers and butchers have it in their power to still further raise the standard of the veal offered for sale, and on this more than anything else, depends the development of a growing demand for higher priced veal.

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CATTLE FEEDING IN MANITOBA, SASKATCHEWAN AND ALBERTA.

By George H. Greig, Winnipeg.

Under this division we may consider chiefly the finishing of export cattle. True a very large proportion of all the cattle produced in these three prairie provinces are not export cattle, yet the standard of quality demanded is the export market.

No attempt will here be made to deal with the feeding of 'baby beef' or early maturing fat stock show or Christmas market beeves, local markets for such being, as yet, comparatively limited, although, of course, capable of development. This is, however, a trade worthy of cultivation and in the production of high quality show stuff there is opportunity for the exercise of the very highest development of the breeder's and feeder's art.

In almost every district, from east to west, and north to south in these prairie provinces, nature has, with such lavish hand, provided all the essentials for live stock husbandry, that one marvels that every breeder is not also a finisher of export or high quality butchers' stock. Why should any man sell his calves or yearlings, or two-year-olds, until they are ready for the block? Freight charges, one or two commissions, and other expenses are thus added to the cost of producing such a steer, and this expense generally comes off the original producer. Local conditions do, however, sometimes make it imperative that cattle pass through several hands before they are finally ready for the beef market, and here, with double force, the old adage 'well bought is half sold' stands true. The man who buys cattle to feed places the first insurance on his success by the discrimination and judgment with which he purchases.

In discussing cattle feeding, the first thing to be considered is the quality of the stocker. A first-class exporter cannot be made out of a low grade scrub no matter how much feed is put into him. Quality counts. Market toppers are only made out of well bred stockers into whose production has gone abundant feed of good quality, under skilful and experienced management. Reference has already been made briefly to the breeding of the beef animal, and stress has been laid upon the importance of using none but bulls of the right type and of as good breeding as possible. The need of good management and careful oversight of the young calves and yearlings has also been cited, and it now seems superfluous to dilate further on the kind of beast necessary to make a profitable feeder. Suffice it to say he should be well bred and well developed for his age, of the low set, thick fleshed, blocky type, with smooth back, well sprung rib, a good heart girth and plenty of middle. A hornless, or dehorned steer is preferred by most feeders, being more docile, larger numbers may be fed together with less feeding or trough accommodation. Hornless steers are also less liable to injury in feed yards or in shipping. The better condition the stocker is in when placed in the feed lot, the shorter should be the time required to finish him, and generally speaking, the shorter the feeding period the greater the profit.

The age of stockers is also of importance, dependent, however, in some measure on the conditions under which feeding is to take place, and to some extent upon the market for which they are intended.

In referring to the various methods of cattle feeding applicable to the provinces of Manitoba, Saskatchewan and Alberta, provincial boundary lines cannot be used in

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defining the districts, or areas, in which any one system is followed. For convenience, therefore, let the territory be divided according to the general methods in vogue in each:—

1. *The ranching methods* covering a large area of southwestern Saskatchewan and southern Alberta, extending well towards the centre of the latter province. This practically covers the area in which cattle are run the year round in large or in small herds on the open range or under fence, under what are commonly spoken of as 'range conditions,' in some cases without provision for winter feed, and in others where a supply of hay at least is always provided against a time of need.

2. *The semi-ranching methods* as adopted in such districts as Moose mountain, Dirt hills, Qu'Appelle valley, and in large areas of northeastern and northern Saskatchewan. Here comparatively large herds frequently run under fence or herd in the summer season, provided with cheaply improvised shelters or natural bush shelter during the winters, and fed hay or straw.

3. *The mixed farming methods* as followed in many parts of Manitoba and Saskatchewan and in northern and central Alberta, where comparatively small herds are run on the native or cultivated pastures and given barnyard care, of a more or less highly developed character, during the winter.

1. THE RANCHING METHOD.

1. Under the ranching method proper, until during the last few years, little or no feeding was attempted. The rancher after selecting a location as favourable as possible for his homestead and corrals, generally a good watering place, proceeded to lease from the Government, or acquired, as much grazing land as necessary for his herd.

The range is then divided into winter and summer ranges and the stock duly branded and turned on either under herd or fence. The bulls are herded by themselves until the proper breeding season, about July or August, when they are put with the herd, an average of one bull to 25 or 30 females. Where there are steers old enough— three or four years old—to market, a 'beef round up' takes place in the fall, early or late, depending on the condition of the cattle, the market demand, and the necessity of the rancher. The beef 'cut out' may be exported or simply butchers' cattle, or a mixture of both, together with old cows and worn out bulls, fit only for canners. If some of the steers, even the older ones, are not fit for market, they are simply left to run the range for another year in the hope that by that time they will be 'beef.' The winter range having been protected from summer pasturing, and from fires, is expected to carry the unsold young steers and 'she' stock through the winter, without any additional feed. But through severe losses in the past, every intelligent rancher now recognizes the importance of providing a supply of hay or other fodder against the day of necessity.

The hay usually provided in this region is what is known as 'prairie wool,' which is simply the short, nutritious, upland prairie grass cut on land not mowed nor pastured over the previous year, so that the old dried grass is mixed with the new. It is raked up immediately behind the mower and stacked the day after cutting. The succulence of the newly mown grass is said to be absorbed by the withered grass of the previous year's growth, making the whole good feed. In putting up hay on a large scale a full gang consists of four mowers, two racks, two sweeps and a stacker, requiring twelve men to operate. Hay is not touched with a hand fork except to spread it about on the stack. A complete outfit will mow, rake, sweep and stack from 45 to 50 tons a day. Frequently this work is let by contract at from $1.75 to $2 per ton,

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measured in stack after settling for thirty days. Brome grass (Bromus inermis) western rye grass (Agropyrum tenerum) and Timothy are also used to some small extent as hay grasses where irrigation is practised.

Winter Hay Feeding.

Within the last few years, however, owing to changing conditions on the range, due in part to the great influx of settlers preempting the watering places and dissecting the range lands with barb wire fences, winter feeding has been practised in some sections. One plan tried with fair success is known as 'Hay Feeding.' Hay or 'prairie wool' such as above described, is put up in quantities. Feeders are selected, usually three and four or five year old steers. The corrals are located near water and the hay drawn in daily and scattered on the ground direct from the big basket racks into which it is loaded from the stack, one man only being necessary to the team. Tubs with barrel salt and sometimes a little sulphur, are placed where the cattle can always help themselves. Three hundred and fifty head will consume about a barrel of salt a week. Apart from this no other attention is given the steers, and while cattle thus fed do not generally make very great gains in a feeding period of 180 days, a good four year old will gain about 100 pounds, there are always some lusty feeders which will ship well out of such lots, for good butchers', or even exports, while many will hold their own, or a little better, and ship early, say in July, off grass, and thus meet a good market. For finishing such cattle it is well to have pasture which was not eaten close the previous season, as they then eat the old cured grass along with the new, which gives them a full stomach and does not scour. Such pastures give an advantage of at least two weeks over that which is closely cropped.

It is estimated that hay costs about $3 per ton delivered in the yards to the cattle on about a two to four mile haul, and it requires from four to five tons to winter a four year old steer.

At one camp near Didsbury, Alta., visited by a representative of the department, 300 head of four-year-olds were kept supplied with hay, which was stacked from two to five miles distant from the feed grounds, by three men, each with a team and large basket rack, capable of holding from 2,500 to 3,000 pounds of hay. In another camp four men and teams supplied 500 head of four-year-olds, but the haul was not quite so far. In these camps the steers had absolutely no shelter, neither hills nor brush. Open sheds had at one time been provided, but were abandoned as it was found that in cold spells the steers would bunch into these sheds, when the heat generated by their bodies would cause them to sweat and then they would chill on going into the open to feed. Winter hay feeding means giving cattle all they can use; hay, water and salt, each in abundance.

Hay and Unthreshed Grain.

Some profitable feeding has been done, using unthreshed sheaves of grain as the chief part of the ration. Perhaps in this connection the experience of Mr. John Ross, a rancher living northwest of Pincher Creek, Alta., as described by a representative of this department, may be cited. Mr. Ross is both rancher and farmer, breeds all his feeders, and they are good ones, prefers feeding four-year-olds and considers they do best in cold weather. He aims to have them ready for market by the end of March so as to be out of the way of the spring work. He has fed from 80 to 100 head the last three winters. Sheaf oats constitute the chief ration, but during the winter of 1908-9 sheaf wheat was fed. It was late sown fall wheat which did not ripen evenly and would have made low grade wheat. He fed 57 four-year-old steers and 16 spayed heifers of the same age; started feeding at Christmas. The ration consisted of two sheaves of wheat per head each evening, about 20 pounds of native hay in the morning,

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running water in feed lots and rock salt always available. The cost of feeding may be estimated:—

Labour at $35 per month, including board, about $1 per head.

Grain, say 20 sheaves to the bushel of such uneven crop at 60 cents. per bushel unthreshed on the ranch, about 6 cents per head per day.

Hay at $7 per ton, a very high price, being so near the great mining camps on the Crows' Nest Railway—7 cents per head per day. Making 13 cents per head per day for feed—for 100 days $13, and labour, $1; making a total of $14 per head for a feeding period of 100 days.

No outlay for buildings, sheds, wind-breaks or feed boxes was necessary. These cattle were sold April 1st at $60 for steers and $48 for heifers. The bulk of the steers, with a few culls taken out, would weigh 1,400 pounds, and the heifers, nice, smooth, and even fleshed, from 1,150 to 1,200 pounds. The benefits claimed for this system are:—Fall markets are glutted with grass beef, buyers only want 'tops' and are in a position to dictate both as to price and selection. In the spring prices are better and conditions reversed; sellers have more to say as to selection and price. Besides, range area is being reduced and cut up by settlers and 100 head of matured cattle require as much grass to finish them as would carry twice the number of young cattle, as well also as relieving the winter range by the number put into feed lots.

Sugar Beet Pulp.

Feeding sugar beet pulp is being experimented with in the immediate neighbourhood of the Knight Sugar Company's factory at Raymond, Alta. When the factory is in operation the pulp is dumped into a large lumber-lined open pit where it remains without cover until the coldest winter weather is past. Towards the end of March the cattle are taken in off the range and penned in open yards near the factory. The pulp is drawn from the pit in wagons and shovelled into the feed boxes. (Beet growers can procure this pulp at from sixty-five cents to a dollar per ton.) At the time the representative of the Department visited Raymond, early in April, 1909, 800 head of rather rough, coarse steers were being fed. A liberal supply of pulp and straw was kept before the steers all the time and, in addition, they were fed some well saved timothy and a little alfalfa hay, together with a light grain ration of from two to three pounds per day. The feeding period is from 90 to 100 days during which time they are expected to gain from 250 to 280 pounds and be ready for market towards the end of June.

Alfalfa.

As irrigation becomes more generally introduced throughout southern Alberta, the growing of alfalfa hay will doubtless become a great industry, as from experiments already made it does remarkably well in this district. When alfalfa is grown on a large scale, it will undoubtedly greatly assist in developing a very large feeding industry.

Grain Feeding.

With the rapid settling of the country, vast quantities of coarse grains are produced, which, with the heavy freight charges from far inland points, reduces its market value. This cheap grain, together with the curtailment of the ranges and the improvement in beef prices, has encouraged winter grain feeding. The centre of this industry at the present time may be said to be in the Lacombe and Stettler districts of Central Alberta, although of course, grain feeding is done on a large scale in many other sections of the west. During the winter of 1908-9 upwards of 3,000

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head of cattle were grain fed in this one district. There are many who feed from 10 to 20 head of their own raising each year, using only such feeds as are produced on their own farms, and others who feed on a much larger scale. Practically all the feeding is done in the open, in yards provided with natural or cheaply improvised shelter. Water must always be available. Well cured native hay seems to make better feed than timothy unless the latter is cut very young. Oat sheaves cut green and oat straw make variety and valuable additions to fodder rations. In a roomy feed lot hay and fodder may be fed scattered on the frozen ground with but little waste, but in soft weather, in spring, there is considerable waste unless fed in racks.

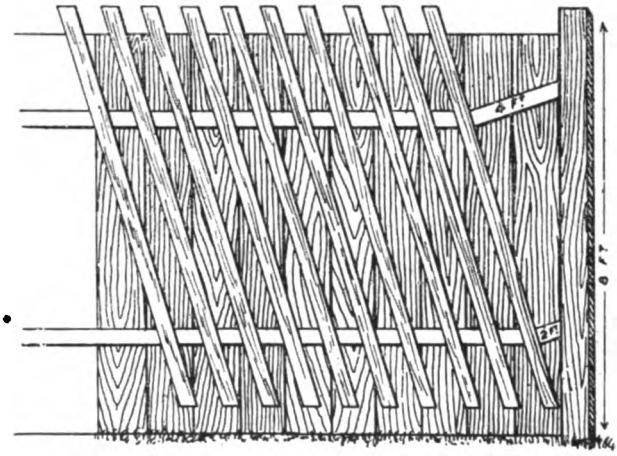

FIG. 38.—AN OUTDOOR FEED RACK.

Fig. (38) shows a good form of hay rack seen in the feed lot of D. Riley, High River, Alta. It is built on the corral fence and made of 1 inch by 4 inch battens, high enough so that the cattle cannot bring much pressure on it. The space of about 6 inches is left open at the bottom between the slats and the fence, which allows the old bottom grass and rubbish to fall.

For outdoor feeding oat chop alone is not strong enough. Cattle thrive better when fed 50 per cent barley chop and 50 per cent oat chop, the percentage of oats to be greater at the beginning of the feeding period and the barley steadily increased during the last 90 days. The method of supplying the grain ration varies greatly; most feeders believe in a limited ration, fed once or twice a day, beginning with from two to four pounds and increasing as the period progresses to from eight to twelve pounds per head per day. A few, including some of the most successful, use the self-feeder or what is called the 'full feed' method, that is, a limited ration is supplied for a short period, say twenty or thirty days, and then the troughs or feeding tables, or self-feeders are filled and kept supplied all the time, and the steers allowed to help themselves. Some of the best cattle seen in the west in the spring of 1909 were finished on this full feed plan. Little or no trouble seems to be experienced from over-feeding. Perhaps heifers or young steers are a little more liable to sicken themselves than four-year-old steers.

A feeding table is made about 3 ft. 6 inches wide, with a 2 by 4 inch or 2 by 6 inch scantling round the edge to keep the meal from falling or blowing off. It should be elevated 2½ or 3 feet off the ground and placed so that the cattle can feed

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at both sides. A very good feed table is illustrated in Fig. 45 showing the pen of prize winning Galloway steers at the Calgary Spring Fat Stock Show. A 12 foot trough gives 24 feet feeding room, and would accommodate under 'full feed' 100 head

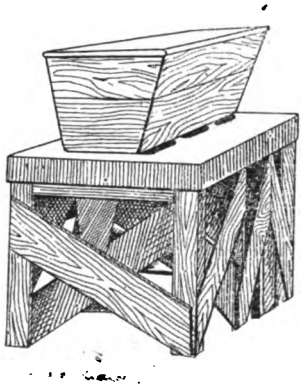

FIG. 39.—FEEDING TROUGH WITH HOPPER. (End view.)

of cattle. A feeding trough with small hopper in centre is illustrated in Figs. 39 and 40. This plan prevents the high winds, when the trough is exposed, from blowing the meal away and also helps to prevent waste by the cattle.

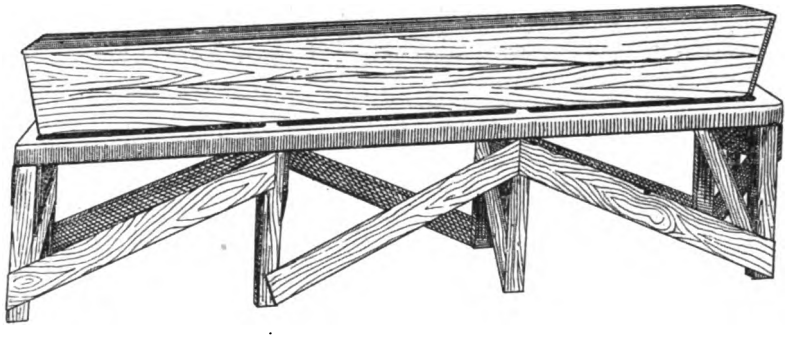

FIG. 40.—FEEDING TROUGH WITH HOPPER. (Side view.)

Contract Feeding.

There are always a large number of mature cattle that from bad wintering, or poor pasturage, are too thin to ship in the fall. The culls from the large droves handled by the big dealers are frequently winter fed on hay or grain, under their own management, but sometimes they are leased out in smaller bunches for winter keep and finishing. Contracts are sometimes made on one or other of the following plans:—

1. To run mature cattle through the winter on hay or straw, $6 per head.

2. To run mature cattle through the winter, giving all the hay they will eat, $12 per head.

3. For grain feeding, 1 cent per pound for the fall weight, and an additional 4 cents per pound for the gain between fall and spring weights. That is, if the steer weighs in the fall 1,200 pounds, and gains 200 pounds, the feeder would get $12 for feeding and $8 for the increase in weight, or $20 for 100 feeding days, which is the stipulated time under such contracts.

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4. Another plan which insures liberal feeding and careful selection of well bred steers, is a contract allowing from 10 cents to 14 cents per pound of increased weight, the price depending on the distance from market, which, of course, affects the value of the grain fed. A well bred steer of the right type should in 5 to 5½ months increase from 250 to 300 pounds, so that at even 10 cents, a fair profit is assured. Prices for feed in these districts may be quoted as: Prairie hay, $3 per ton; oats, from 24 cents to 26 cents; barley, 35 cents.

Grain Feeding in the Open.

Out of door feeding does away entirely with the necessity for expensive buildings; it reduces labour to a minimum, one man being able to feed from 80 to 100 head. Cattle so fed thrive well, consume perhaps a greater amount of feed to make equal gains, but their digestion is better; they are more contented (wild range four-year-olds when got on to 'full feed' will lie around yards without getting up on the approach of attendants) and being better muscled than stall fed bullocks, ship with less shrinkage and loss. It must be observed, however, in outside feeding that mature cattle do best; four-year-olds stand the cold better and make more profitable gains than younger cattle. The feed lots should be roomy and the cattle always well bedded; a constant supply of good water easily attainable is an essential. A liberal supply of good hay or fodder, a variety preferable, and a generous grain ration is of greater importance than shelter. A supply of salt should be within reach at all times.

Perhaps we cannot do better here than quote from the valuable experience of Mr. T. W. Bannister, on the Bow Valley Ranch, near Calgary, during the past four years. The cattle here were put in a small yard with open shed about December 10 each year. They were good cattle of uniform type, carefully selected. The yards were kept well bedded and the racks full of hay, native hay, brome grass and oat sheaves being supplied, thus giving variety. After cattle have been in yards a week one sheaf of green oats per head is given in the middle of the day for ten days, then the next ten days 2 lbs. of oat chop per head once a day is added, to be increased the following ten days to 2 pounds twice a day, and subsequently increased about every two weeks. During the last six weeks 25 per cent barley chop is mixed with the oat chop. Water and salt in which a little sulphur is mixed is available at all times. The following are the results of each of the four year's tests:—

	Average.
1905—14 steers:	
Fall weight	1,657
Finished weight	2,012
Average gain per head in 90 days	355
Consumed 800 lbs. of meal in test.	
1906—11 steers:	
Fall weight	1,675
Finished weight	2,010
Average gain per head in 90 days	335
Consumed 800 lbs. of meal in test.	
1907—12 steers:	
Fall weight	1,400
Finished weight	1,730
Average gain per head, 100 days	330
Consumed 800 lbs. of meal in test.	
1909—12 Galloway grades (Galloway bull—Shorthorn cows):	
Fall weight	1,290
Finished weight	1,640
Average gain per head, 130 days	350
Consumed 1,050 lbs. of meal in test.	

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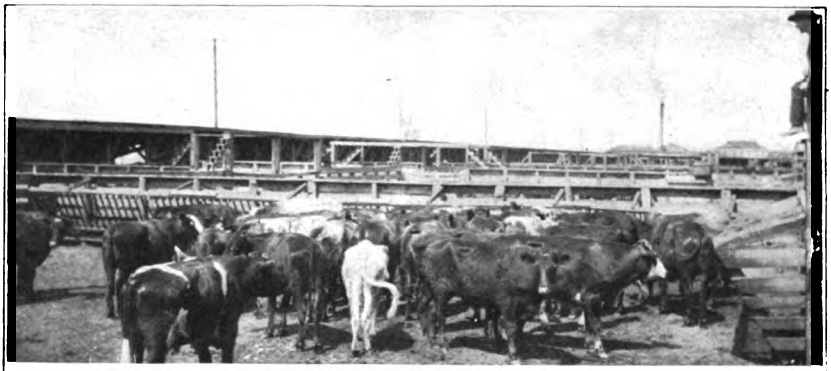

Fig. 41. A carload of culls.

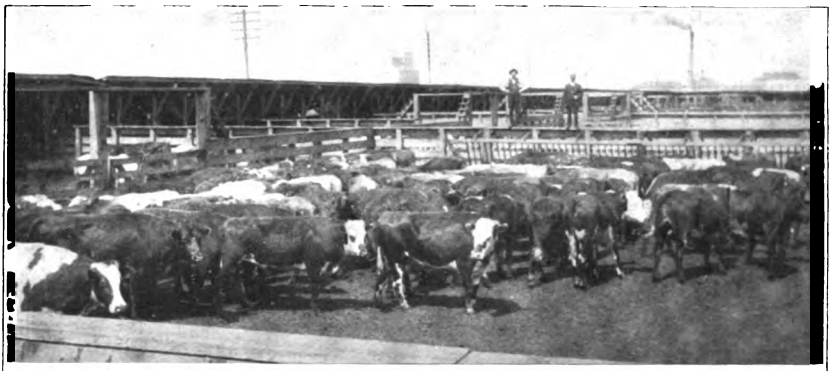

Fig. 42. Range Cattle in the Winnipeg Stock Yards.

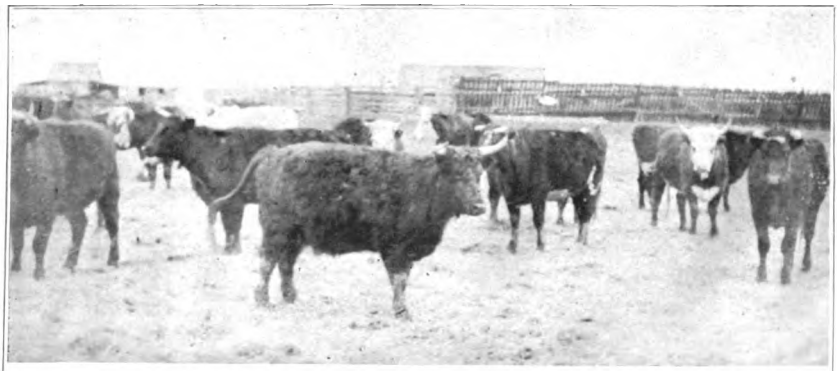

Fig. 43. Group of Spayed Heifers, High River, Alta.

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Fig. 44. Thick fleshed steers, fed in the open in Alberta.

Fig. 45. Champion Galloway Grades at the Alberta Provincial Fat Stock Show, 1909.

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Cost of feed and labour:—

1,050 lbs of meal at 1 cent per lb	$10 50
6 bush. (estimated) oats in sheaf	1 80
2½ tons hay at $4 per ton (native hay, $3; Brome, $5)	10 00
Labour, $1 per head	1 00
	$23 30

At the Dunbow Indian Industrial School on the High river, near Okotoks, our representative gathered some interesting statistics. The work is all done by Indian boys, under the direction of the Superintendent. Winter feeding has been carried on for the past 11 years. Cattle have always been tied up in comfortable log stables until this year, 1908-9, when they have done so much better in the open corrals that this method will be adopted altogether in future. In the winter of 1908-9, 300 head, mostly four-year-olds, were fed. They were weighed in the fall and fed till May 1 under a contract of 13 cents per pound for the increased weight. They were fed native hay at $3 per ton in stack, with a little oat straw in December and January. Hay was fed on the ground three times a day. Meal, one-third barley and two-thirds oats, ground fine, was fed once a day in long open troughs. Water was always available in river adjoining yards; salt was always before them. The shelter consisted of close board fence round corrals protected by the high banks of the river.

Rations:

Hay all they could eat, 150 days, 3 tons at $3	$9 00
Meal from Feb. 15, from 5 to 10 lbs., 75 days=6,301 lbs.	$6 30
Cost of feed	$15 30

An average gain of 200 lbs. at 13 cents, would yield a profit of $12.70 on cost of feed.

Fourteen head of fairly select three-year-olds were fed loose in old log stable, let out for exercise and water every day, and fed 3 tons hay and 766 lbs. meal per head. Meal was fed three times a day as follows:—

January,	30	days at	5	lbs.	per head	150 lbs.
Feby.	28	"	7	"	"	196 "
March	15	"	10	"	"	150 "
"	15	"	18	"	"	270 "
						766 "

These cattle averaged 1,388 lbs. and were exhibited in prime condition at the Calgary Spring Fat Stock Show. *See* Fig. 45.

The following figures were furnished by Mr. W. E. Ross, Lacombe district:— Mr. Ross keeps about 140 head, raising 20 calves a year. He has been winter feeding for 14 years; abandoned inside feeding, finding it unprofitable on account of the labour involved. The winter of 1908 he fed 50 head, 32 of which he bought in the fall, three and four-year-old steers. He has hill and bush shelter. He started feeding meal December 15 and expected to feed for 135 days. He estimated each steer would consume three tons of hay and 650 pounds of meal. Sixty tons of hay were purchased at $3.50 per ton delivered in feed racks. Meal cost 90 cents per cwt. Being 20 miles from market expense of crushing equals cost of hauling to market; 50 cents per head would cover cost of salt, opening water holes, etc. This makes a total of about $18 per head for hay, meal, salt and labour. He paid $33 per head with a 5 per cent shrinkage for the steers purchased in the fall and sold for early May delivery on the following basis:—

Steers	over 1,400 lbs	$5 00 per cwt.
"	between 1,300 and 1,400 lbs	4 75 " "
"	under 1,300 lbs	4 50 " "

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Mr. Ross expected to make $16 per head out of the lot over and above the cost of feed and labour.

A very interesting article contributed by Mr. W. F. Puffer, M.L.A., Lacombe, who has had large experience, fully describes what he considers the best method of feeding.

Intensive Fattening.

By W. F. Puffer, M.L.A., Lacombe.

In the district around Lacombe and Red Deer, and in fact in that part of the province generally spoken of as Central Alberta, the winter feeding of cattle is becoming quite general.

There is still plenty of grass throughout this district but the farmer and homesteader is already occupying considerable areas. The country is somewhat rolling with abundant water, and dotted with frequent groves of poplar and some spruce, affording excellent opportunity for winter feeding in the open without the expense of stabling.

The method of feeding which is now being generally followed and which, after an experience of twenty years of cattle feeding, most of the time in Alberta, I have myself found to give the most satisfactory results, I will describe briefly. First, let me say that I strongly favour feeding in the open, and that I am convinced that many of those who attempt feeding cattle do not feed grain with sufficient liberality to obtain the best results. This, I believe, is one reason why Canadian cattle are generally quoted on the Liverpool market 1 cent per pound lower than United States' cattle. In the United States' feeding districts, cattle are put on a full feed of corn almost from the start, which is kept before them constantly for six or eight months. One hundred bushels of corn is reckoned as the requirement of an ordinary steer during the feeding period. This method gives rapid gains, producing better cattle, which make better prices than where limited grain rations are fed. The disposition of a thoroughly fattened steer is changed; he becomes docile and contented, ships better and thus brings a better price at the end of his life's journey. We have just as good cattle here as in the United States. Chopped barley, wheat and oats are fully equal to corn as a fattening ration, but we must give the cattle all they will eat of it, and when we learn to do this, I contend that our cattle will not sell at a lower price on the British market than United States' cattle.

I have been pleased to note that some good work is being done by the Superintendent of the Experimental Farm at Brandon in outdoor cattle feeding, and I have read with interest reports of other Manitoba farmers who are experimenting along similar lines. I cannot help but think, however, that all these experiments would show better results if they would adopt the method I here describe. At the time the Experimental Farm cattle were sold at Brandon, last spring, for 4¼ cents, which, I fancy, was about their value, a good many cattle were being sold for 4¼ cents, but our best feeders were getting 4½ to 5 cents for cattle for export, and they had to contend with the long rail journey, extra freight and shrinkage, and other expenses, which would make cattle to cost to the dealer in Montreal from 6 to 6¼ cents per pound. (For details of this experiment see Experimental Farms' report, also Dr. Rutherford's special report on the cattle trade of western Canada, page 12).

Now, as to the method: Where there is no natural shelter, a corral with a tight board fence about 7 feet high, with a rough straw covered shed for stormy weather is necessary, and even where there is good natural shelter, cattle will do better with a roughly improvised shed in which to lie down during stormy weather. The rest of the equipment consists of racks for holding hay or rough feed, which should always be kept filled, and the cattle allowed access to them at all times. The grain feeding bunks should be placed in the centre of the corral, or in the open, where the cattle can get all round them. They should be about 2½ feet high, 3 feet wide, with 8-inch sides to keep in the chop, and if made about 16 feet long will be found convenient. With cattle not dehorned, and until they are on full feed, about one of these bunks

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to every 8 head is necessary; after they are on full feed a bunk would accommodate more cattle. Self feeders may also be used and are very satisfactory.

It is perhaps needless to say that attention to the smallest details is absolutely essential to obtain the best results in the feeding of cattle, and this applies just as emphatically with cattle that are being fed in the open, as under the most artificial conditions. They must be provided with plenty of bedding, good clean straw a foot deep; all frozen lumps of manure should be regularly removed so that the cattle may have 'solid comfort.' Remember that when cattle are lying down quietly and contentedly chewing their cud they are making the most money for the feeder.

As above stated, the feed racks should always be kept filled and I always like to supply the best hay at the first of the season before the cattle have got on to the full grain feed.

I find, like Mr. Grayson, of Newdale, that finely chopped grain is best, being more easily digested. Barley and oats ground together is what is usually fed; sometimes oats and wheat, but I have had better results from feeding barley alone. I like to put in three-year-old steers weighing about 1,200 pounds. I begin feeding about the 1st of December 5 pounds of chop once a day, gradually increasing this till about the 15th of the month to 4 pounds, twice a day, which is still further increased until by the end of the month 6 pounds twice a day is being fed. This is gradually increased for the next ten days or so when a little chop will be left over in the bunks; they should then be filled up and never allowed to get empty. I find more grain is eaten the third month than the second. Steers, such as referred to above, will sometimes average 2 pounds per head per day when on full feed, depending on the size of the steer and the quality of rough feed and also, to some extent, on the weather. Steers of good breeding will gain in weight in five months from December 1 to May 1 from 350 to 500 pounds. Such steers will continue growing after the date mentioned until sold, and I am sure no one ever yet experienced any difficulty in getting a good price for such cattle in the spring.

I suppose objection would be raised to the amount of grain fed, but I contend that half-way methods don't pay, and, in my experience, the results obtained justify the extra quantity of grain. On limited rations, steers do not become contented; they remain on their feet too much of the time playing and fighting with others, thus wasting a certain amount of the feed consumed, whereas when put on full feed, even the wildest cattle soon become lazy and lie down a great deal of the time when, as I have already said, they are making flesh economically.

Another important item is the water supply, and it is most essential that water should at all times be available. If water is supplied from a well, a tank heater is a necessity to keep the water in the troughs from freezing, and it will pay for itself in a short time if twenty head or over are being fed. If the water is supplied from a lake or a stream then ample water holes should be provided, and attention should be given that these are made convenient for drinking from so that the animals can stand comfortably. This can be done by making a long narrow opening in the ice, say not over twelve inches wide, and as long as necessary. A little ledge should be left all round the edges of the water hole to keep their feet from slipping in, and the ice should be chopped away at the back so that their hind feet are down almost on a level with their front feet. The ledge round the water hole will also prevent the water from becoming contaminated on warm days. Barrel salt, I find best, and it should not be allowed to get lumpy or hard.

Experimental Feeding in Alberta.

At the Dominion Experimental Farm at Lacombe, Alberta, Mr. Hutton, the Superintendent, during the winter of 1909-10 conducted a very successful feeding test of beef cattle. The description and results of the test are extremely interesting as they show that eighteen steers fed practically in the open air made an average profit per head of nearly seventeen dollars.

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Nineteen head of two or three-year-old steers were selected, but one died early in the test, so only eighteen head will be considered. They were a mixed lot of Shorthorn, Hereford and Galloway grades. They were weighed in at an average weight of 1,130 pounds and cost 3⅛ cents per pound, plus the expense of buying and shipping to the farm. Part of the bunch was started on feed about December 8 and the rest about December 23. They were fed for 109 days and sold on March 30 at 5¾ cents per pound, which is a high price for steers in Alberta. They weighed out on March 30 at 1,318 pounds each, thus making an average gain of 188 pounds each in 109 days, this being a gain of 1·7 pounds each per day for the period.

The ration consisted of upland prairie hay, timothy, and frozen wheat with perhaps 5 per cent of oats and barley screenings. The grain ration for the most part was straight frozen wheat ground. A good deal of it was held over from the 1907 crop and some was so badly frozen that only 37 cents per bushel was offered for it in the fall. Some screenings, probably around five per cent, were also fed with this frozen wheat so that the entire grain ration was practically unmarketable grain. The steers were started on 3 pounds of this ground grain per day per head and by February 25 they were receiving a full feed of around 16½ pounds each per day. They were given just what grain they would eat and clean up nicely. Grain would have been kept before them all the time but they could not stand it. The upland prairie hay was substituted for timothy late in the feeding period because of a shortage of the timothy hay. Little hay was consumed, probably not more than a ton per head during the entire feeding period. During the whole time the steers had access to water and salt at all times and the racks were kept supplied with hay. A tank heater was used, not to warm the water but just to keep it clear of ice.

The steers were fed in an inclosure about 70 feet wide by 80 feet long, with sheds for them to run to if they liked. But they preferred to be outdoors and were scarcely inside all winter. They fed well all winter and at the end of the 109 days were a well finished lot. When slaughtered they dressed out 61 per cent warm and 59 per cent cold, a very good percentage indeed; 55 to 57 per cent being considered a good dressing percentage. In estimating the profits the timothy was valued at $7 per ton, this being the average prevailing price in the Lacombe district. The upland prairie hay was put at $6 per ton, just about twice what the average feeder would want to pay for it. Then the grain was put at 40 cents per 60 pounds, or ⅔ cents per pound, being the market price in the fall, plus the cost of grinding. The labour required and the interest on investment were set off against the value of the manure secured. The cost for shelter was nothing and Mr. Hutton does not think any winter shelter is necessary for fattening cattle in that district.

This experiment has been valuable for several reasons. It has shown, for one thing, that steer feeding may be carried on profitably. Also it has demonstrated that poor grain can find a profitable market on foot. On the basis figured above, the steers returned $1.28 per bushel for all the grain consumed. Two-thirds of a cent per bushel would ordinarily be a little too low value to put on grain, but in this case it was slightly above what the market had offered for it. Figuring results on the basis of nineteen head, the number started with, and deducting cost of steer that died, the net food consumed while on feed for the steer that died, the net profits per head were $14.35.

The following table gives the results:—

Number of steers in lot	18	
Gross weight weighed in	20,337	lbs.
Average weight per head, weighed in	1,130	"
Number of days fed	109	
Gross weight, weighed out March 30	23,720	lbs.
Average weight, weighed out March 30	1,218	"
Total gain in 109 days	3,383	"

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Average gain per head	188 "
Average daily gain per head	1·72 "
Average cost per 100 pounds gain	$7.42 cts.
Value per bushel of frozen wheat fed and marketed as beef	$1.28½ "
Interest on investment for buildings and necessary shelter	00 00

COST.

18 steers of weight 1,130 pounds, at 3·658 cts. per lb	$744 01
26,216 pounds prairie hay at $6 per ton	78 65
9,123 pounds timothy hay at $7 per ton	31 93
20,810 pounds frozen wheat chop at ⅔ cts. per lb	138 73
145 pounds salt	1 75
The cost of 222 hours labour and interest ($18.75) on money invested in cattle is not figured, but it is more than covered by value of manure available for application to the land.	
Total cost	$995 07

RECEIPTS.

Sold 18 steers, total weight 23,720 pounds, less 5 per cent at $5.75 per 100 lbs.	$1,295 70
Profit on gain of two pigs following steers during last 6 weeks of feeding	4·75
Total receipts	$1,300 45
Total cost	995 07
Total profit	$305 38
Average profit per head	16 97
NOTE.—Loss of one steer, 1,130 pounds at 3·658 cents, plus value of hay and chop consumed	$49 69
Less 51 pounds hide at 5 cts	2 55
	$47 14
Profit of $305.38, less $47.14	$258 24
Average profit per head covering this loss	14 35

II. SEMI-RANCHING METHODS.

There are comparatively large areas of rough, broken land, well supplied with water and nutritious grasses, lying adjacent to or surrounded by great wheat districts, as indicated under the second heading and entitled, for convenience, semi-ranching districts. In most of these sections, native hay is plentiful and conveniently put up and stock can be cheaply wintered in hay-roofed sheds. As a rule not much winter feeding is done; cattle are shipped off grass in fall to the export or butcher's market, or, if not fit for the latter, are sometimes moved into the grain districts to finish. As cattle from these smaller ranches are partly domesticated, they readily accommo-

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date themselves to yard or open air feeding, and, as pure bred bulls are very generally used, the stockers show good breeding and make first-class feeders. Where cattle are fed they are generally handled loose in cheap sheds, as shown in Figs. 46 and 47.

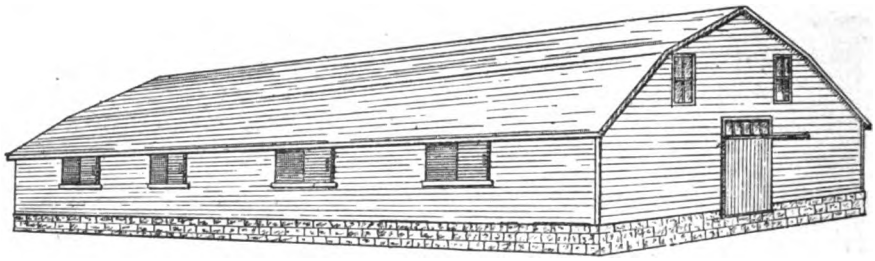

FIG. 46. SHED FOR FEEDING CATTLE LOOSE.

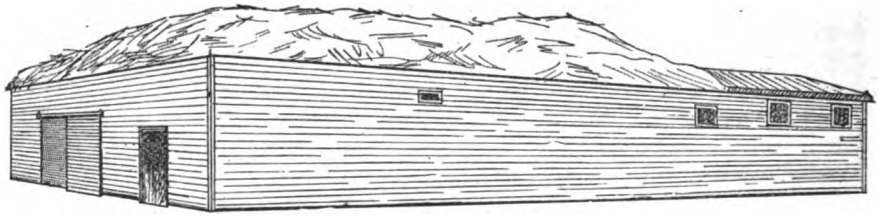

FIG. 47. STRAW COVERED FEEDING SHED.

Fig. 47 shows a straw-covered shed on the farm of Mr. Hugh Kippen, near Arcola, Saskatchewan, in which 50 head or more can be fed. Fig. 6 shows a frame feeding shed on the farm of Mr. W. H. Bryce in the same neighbourhood, which will accommodate about 100 head, all cattle running loose, of course. The latter is a more expensive structure but of a more permanent character.

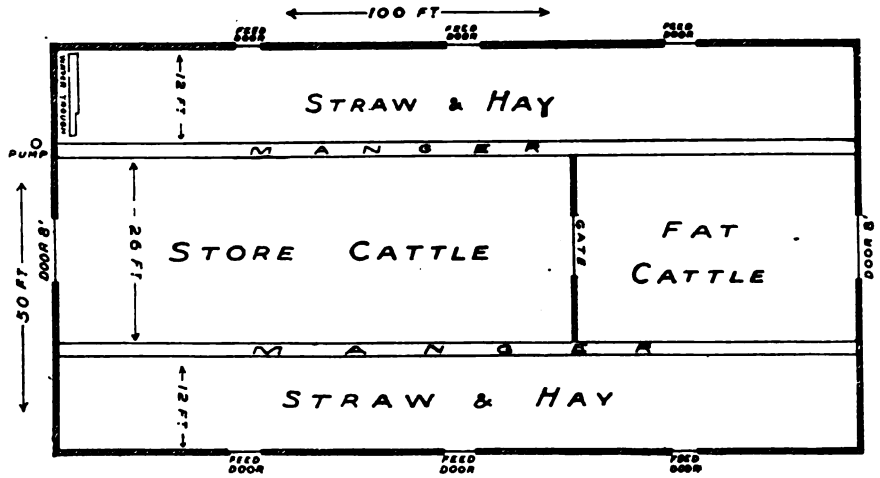

FIG. 48. GROUND PLAN OF BARN OWNED BY W. H. BRYCE.

This building cost about $1,000. It is 100 by 50 feet, on stone foundation, 1 foot high. The foundation extends not only under the outer walls but full length under the two rows of posts supporting the roof, where it is utilized for manger bottoms. The

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straw or hay is unloaded from wagons through large sliding doors under the eaves, as shown in Fig. 46. After using this shed for several years, Mr. Bryce says if rebuilding he would arrange the interior on the plan shown in Fig. 49. The centre space would hold a greater quantity of fodder and the two 15-foot spaces would provide more accommodation for stock than the one 26-foot space, besides which the building could be much better lighted.

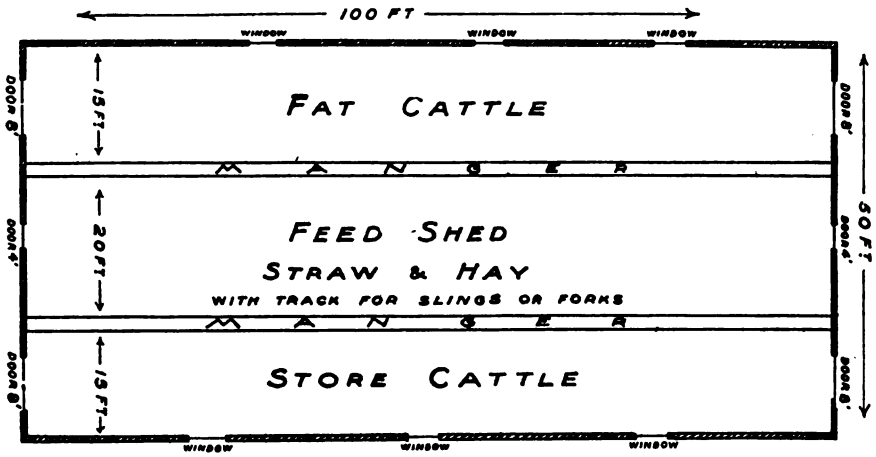

Fig. 49. Improved Plan of Barn Owned by W. H. Bryce.

Feeding.

As to feeding methods, little need be added to what has already been said. Three-year-olds are preferred to twos, as the latter incline to growth of frame rather than flesh. Nearly all feeders favour dehorning. It is always important to keep the grass flesh on the stockers and begin feeding in the fall before they loose flesh, from November 1 to 10. If young, thin cattle are put in they will have to be carried through the long period to May, or perhaps June, to make a good finish and strike the highest market. Those who buy in the fall count on doubling their money on a six months feed, or when buying store cattle of all ages in spring, count on a return of $10 per head per year.

In the districts now under consideration, adjoining, or right in the wheat sections, more straw is fed than is usual in the range areas. Oat and barley straw of good quality, cut a little on the green side, makes an excellent feed. Native hay, however, is still plentiful in many districts, and cultivated grasses are being, year by year, more largely introduced. Owing to the scarcity and high price of labour neither roots nor corn fodder are cultivated beyond very limited patches for use in pure bred herds. Oat and barley chop or wheat screenings are used about as previously described.

Rape for Early Finishing.

Perhaps the most profitable of all methods of finishing cattle is that described by Mr. R. J. Phin, a large dealer and farmer near Moosomin, Sask., in the following interesting article. The cheapness of production under this plan is the interesting feature and providing good pasture the essential, next to the selection of good stockers. The skill, however, of the dealer in buying and selling is here given greater scope:—

'I have handled from 1,000 to 1,200 steers per year for the past few years, and finished fully half of them on our own farm or pastures. On the scale I have been handling them, I prefer to finish as many in summer as possible. I buy almost all

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my cattle, mostly threes, with a few four-year-olds, in July. If they are on good pasture, buy for fall delivery and secure best grazing possible for the balance. I keep shipping out during the summer everything that is ready. For those that do not finish, a quantity of rape is sown in drills on the summer fallow. It is sown at the end of June or first of July, and cattle are put in about 1st of October. Some grass pasture should also be provided. I begin early to feed meal at night, about a gallon per head at first, increasing as the rape gets eaten down to two feeds daily. I ship out all that are ready by the 15th of November. Those that are not then ready should be reserved for winter feeding.

I have wintered from two to three hundred head during the past few winters. I have fed a few tied up, others loose in large boxes in the stable and a large number loose in open sheds, and last winter, 100 in barn yard. I have grown my own shelter and my yards are well protected. Where there is shelter the big steer can be fed satisfactorily in almost any way so long as he gets plenty to eat and drink. I feed ground mixed grain twice daily and straw, using a larger proportion of oats in the early part and heavier grains towards the end of the feeding period. I buy large quantities, as well as what I raise, and used fully 12,000 bushels last year. Outside cattle get no more grain than others, but they will use up more straw, and should have hay in spring. I have a deep well, 200 feet, piped to the barn and water in stables, and a trough in one of the passage way doors, so that outside cattle can drink from it. I have also a shallow well, tank and heater, and find it works all right.

The best practice for the average farmer, I believe, is to furnish good pasture for all stock he wishes to turn off. It is surprising how few do this. I have some rape when the pasture fails to keep them going and start grain feeding early. It is well to sell early if prices are suitable, if not, feed them for May. A great many make the serious mistake of allowing their cattle to fail until Christmas, and then start to feed. It is easier to keep on three pounds of flesh than to replace one lost pound. In this country it is necessary to feed till May or June to get the best returns, as large stocks of frozen meat are laid in by the butchers in the fall and prices are usually low until May, although there are exceptions.

In winter feeding, the feeder should have an increased price of quarter of a cent per month, that is, steers bought at 3 cents, with four months to feed, should sell at 4 cents or better. Farmers should winter their young steers better. It pays. A very light grain ration added to the roughage makes a great difference. Steers, coming three years old, fed in yards with open sheds for stormy weather, given all the straw they can eat, and about 3 pounds of grain once a day (fed in the evening) will hold their own and be ready to ship off grass early, say about July, when prices are usually good.

I have not dehorned very much, as I often have the cattle only a limited period, but all stock should be dehorned and our domestic cattle should not be branded. Americans always ship dehorned, unbranded cattle. Owing to home demand they are lately able to send forward only second and third-class stuff. Our cattle could easily come in on a level with them if we could only get better railway facilities. The brand and the horn stamp them as Canadians and 'ranchers.' The wholesale butcher on the other side does not like the 'rancher' because he is sure to be bruised more or less, sometimes off colour, and owing to the long periods of starvation, kills out badly, has no kidney fat and little tallow, and consequently brings a much lower price.'

III. MIXED FARMING METHODS.

In the districts devoted to diversified farming, comparatively little cattle feeding is, as yet, being done. In pioneer days when grain crops suffered from frosts, largely owing to lack of understanding of proper methods of soil cultivation, 'mixed farming,' including the breeding and feeding of cattle and hogs, saved the situation in many a district and enabled the settlers to become thoroughly established. In many parts of Manitoba fine stock barns were erected, following the designs of similar structures

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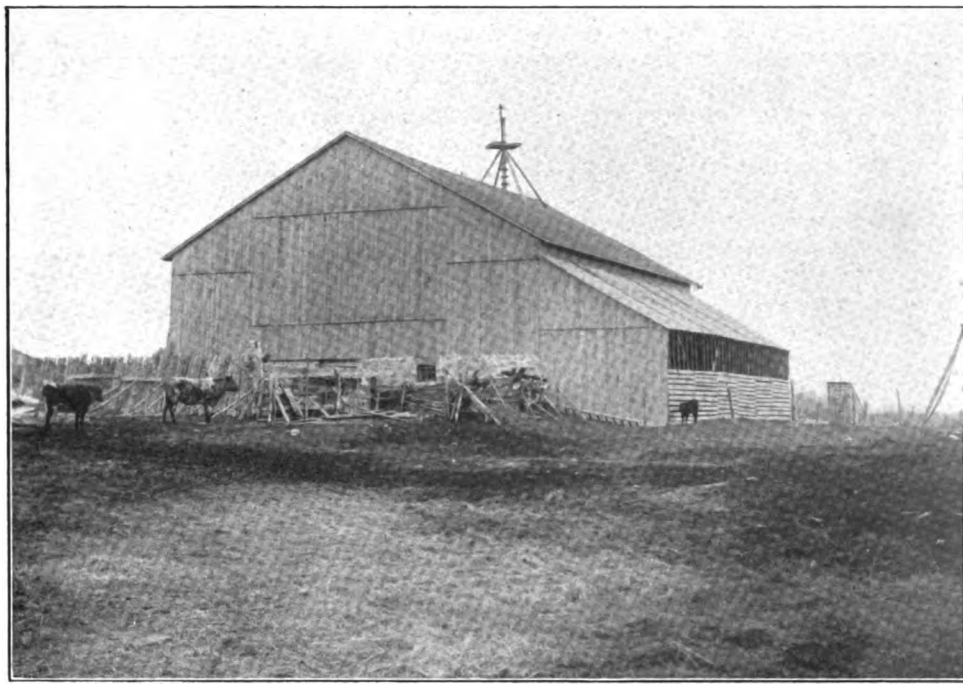

Fig. 50. Deserted Basement Barn, owned by J. L. Cook, Newdale, Man.

Fig. 51. Open Feed Lot, a mile away from buildings, owned by J. L. Cook.

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Fig. 52. Meal time in the open on farm of J. L. Cook.

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on the old farms of Ontario and the eastern provinces, even to the fault of being without light and ventilation. Soon, however, with the adoption of suitable methods of culture and the introduction of improved machinery, wheat growing became almost universally successful, and 'mixed farming' came to be a bye-word and a reproach. The reduction of freight rates on wheat, consequent upon the development of the railroads, together with inadequate local markets for surplus live stock, tended to encourage the growing of wheat and to discourage the breeding and feeding of live stock. Pastures were broken up, barns left unused or converted into horse stables, straw piles were burned, 'money came easy' and wheat was crowned King. The Press, the immigration pamphlet, the railroad folder, the merchant, the banker, the land man and the farmer bowed down and worshipped wheat. But it is wheat that is peopling the west. On these rich virgin prairie lands, nothing gives such quick returns for capital and labour invested as wheat. It enables the thrifty settler in a few short years to become a land owner. The crowded peoples of the old lands hunger for that of which we have a surplus—*Land,* and it is in the satisfying that land hunger that Western Canada gets her population and Canada her prosperity.

But continual wheat cropping almost invariably results in impoverished and weed infested farms. Seeding down to grasses and clovers and the production of corn or other soil cleaning crops is the ultimate remedy, and the pendulum swings back to live stock and mixed farming, which is unquestionably the highest ideal in agriculture.

Continual cropping and bare fallowing exhausts the humus which is so abundant in the virgin prarie soils and which is so essential an element in retaining moisture, warming cold, heavy clays and in preventing the drifting of lighter soils. Humus can most readily be supplied to such worn soils through seeding down to grass or by the application of barnyard manure. Through the agency of live stock the grasses can be profitably marketed and manure manufactured as a bye-product. Further, the incalculable waste that is annually practised on the purely grain farm in the destruction of thousands of tons of straw and chaff, can be avoided. Live stock will utilize these products and a safety valve is also provided in case of crop damage from frost, hail or other untoward circumstances.

Manure.

Manure has generally been looked upon as non-essential. The early pioneer had no use for it, but respected it to such an extent that when the pile got too big in front of his stable door he moved the stable, rather than the manure. The early settler had no use for it either; he drew it out and burned it to be rid of it. Even yet it is quite common to hear very intelligent farmers, who have not given it a proper trial, denounce its use as unnecessary and even injurious to our 'fat fertile lands.' Manure is, however, being used in every district from Emerson to Edmonton, and manure spreaders being sold in ever increasing numbers, particularly in the older sections of Manitoba. From evidence at hand a light coat of ten or twelve loads of manure per acre thoroughly worked in, has the effect, even on the richest soil, of increasing the yield, stiffening the straw and hastening maturity from five to ten days. Letters might be quoted from prominent farmers in many districts, but a few extracts must suffice:

A farmer near Carman writes: 'After ten years experience in applying manure, I find wheat ripens from three to five days earlier. I have had better results from the application of manure, than from land that has been summer fallowed.'

From Southern Manitoba another writes: 'Have been applying manure to my farm here for 25 years. With 12 loads to the acre, applied on sod, wheat and other grains ripen on an average five to ten days earlier than on land right alongside not manured.'

Another from near the same district says: 'Ten loads per acre worked in with a barley crop gives the next year a crop of wheat with stiff straw, good heads, ripening about a week earlier than on other fall ploughing.'

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From an oat growing section in Northern Manitoba, a well known farmer writes:—'Applied on part of field for barley, result a very fine crop on manured portion, as against untreated portion of field, and ready for cutting eight days ahead of the lighter unmanured crop. Same field sown to barley again the following year, crop nearly doubled on manured portion and matured eight to ten days ahead of that unmanured.'

An Oak Lake writer says: 'Wheat ripens seven to ten days earlier and have noticed this same effect on manured lands for three successive years, but I cannot report any improvement in yield.'

A Central Saskatchewan farmer reports an experience extending over twenty-five years: 'The results have always been beneficial, sometimes showing very little the first year, but better the second and even third and quite noticeable for ten or twelve years. We have noticed particularly that upon fields or parts of fields that had been manured anywhere within three or four years, the crop ripened more evenly and at least four or five days earlier.'

From the heavy black soil of the Edmonton district, a correspondent who applies manure every year on timothy sod prior to breaking it up, writes: 'The quantity, as well as the quality of grain is improved, and this is noticeable for five or six crops. The yield of wheat on land treated was not only greater and of better quality, but stood up better and ripened earlier than did the same wheat sown either on breaking or summer fallow. The yield was larger, of just as good quality and ripened just as early as did the same variety of wheat sown upon timothy sod which had not been manured.'

Undoubtedly barnyard manure, properly applied, not only benefits the yield and quality of the crop, but wheat is even of greater importance, where the season is short, it hastens the maturity by several days. This is not a treatise on soil culture, nor even on general farming, but emphasis is here laid on the benefits of manure as a very strong point in favour of the live stock industry in general and steer feeding in particular. For, as has already been cited, steer feeding can be profitably undertaken on almost any farm that has a supply of good water; straw and roughage, and inferior or damaged grain can be utilized, and the residue, manure, turned to good account; expensive buildings are quite unnecessary, even in Manitoba, as is proved by the experience of such men as Mr. Cook and Mr. Grayston of Newdale, Mr. Clark of Pendennis and many others that could be quoted.

Corn and Roots.

It is not generally conceded that the prairie provinces of the Canadian Northwest are included in what is called the 'Corn Belt.' Nevertheless, it is a fact that the growing of fodder corn is on the increase especially in the southern half of Manitoba. Corn harvesters are being sold in considerably increasing numbers and not a few corn cultivators have been introduced. A splendid 50-acre crop of corn was harvested on one of the dairy farms near Winnipeg last year. Some of the early maturing varieties of flint corn such as the Longfellow, Compton's Early and North Dakota Flint seem best adapted to Manitoba conditions. Corn will not mature sufficiently for seed every year, but good ensilage can be made from even the immature corn by wilting it a few days before putting it in the silo (see the 1908 report of the Dominion Experimental Farm, Brandon). Corn fodder, however, does not as yet play any important part in the cattle feeding industry, but, as more intensive methods are introduced it will in many sections become an important element in the rotation as a cleaning crop and the fodder will be utilized in stock feeding.

Root growing is confined as yet to very limited areas and mostly to farms where pure bred herds are maintained. Roots, either turnips, mangolds or sugar beets do exceedingly well, but owing to the cost of labour in handling do not enter into cattle feeding rations except perhaps in a few isolated cases.

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Testimony of Practical Feeders.

We are indebted to a great many feeders and dealers, who, in response to a circular letter sent out during the winter, have furnished much valuable detailed information. Space unfortunately precludes the reproduction of all these letters. From the evidence obtained it would appear that the majority of feeders in the mixed farming areas still follow the old fashioned methods of stabling all fattening cattle, and in many cases, have them tied in stalls. There is, however, an evident tendency to reduce the labour and expense of such methods by feeding in loose boxes and even toward feeding in open sheds or corrals or with natural bush only for shelter.

J. L. Cook of Newdale, Man., after several years' trials in steer feeding in a large basement barn built for the purpose abandoned this method for the open feed lot a mile away from the buildings, on the edge of a ravine with bush shelter only. His 1908-9 bunch of 70 head are illustrated in Fig. 52. Mr. Cook buys his cattle, preferring three-year-olds, weighing from 1,100 to 1,250. Oat and barley straw is his principal roughage with hay for spring feeding. Grain ration is one-third barley meal, one-third shorts, and one-third bran, fed in limited quantities, beginning with 4 lbs. per head per day and increased to 8 lbs. He considers markets too uncertain to put steers on 'full feed' as such cattle would have to be sold when ready. He feeds grain from December 1 to the midddle of June and expects average gains of at least 250 lbs. per head. As to outdoor feeding he says:—

'I prefer feeding in the open with grain fed cattle. Loss is more frequently occasioned with stall-fed cattle being too warm than from being too cold. I always get my best gains with 20 degrees below zero weather.'

Mr. Cook's methods are very similar to those so fully described in Mr. Grayston's article which is herewith appended. The experience of other thoroughly experienced and practical feeders might also be quoted to show that this inexpensive outside feeding can be profitably practised in this climate.

Outdoor Wintering in Manitoba.

By Wm. Grayston, Newdale, Man.

A number of years ago Mr. John B. Cook of Newdale, in connection with the late Dr. Harrison, built a large barn and started somewhat extensively into the business of winter feeding beef cattle. After about three years experience during which time the balance was always on the wrong side of the ledger, another bunch of cattle was bought and fed hay in shelter of the scrub which extends along the north side of the farm, the intention being to bring the cattle to the barn as the weather got colder. The cattle had access to open water in the ravines and appeared to be doing so well that they were left out all winter. A small allowance of grain was added to the hay about March 1. These cattle were sold early in the summer and were the first cattle to net their feeders a profit. Since that time Mr. Cook has continued to feed from sixty to one hundred head of steers each winter, and the writer, as well as others, has done somethting along the same line with satisfactory results. Years ago Mr. Cook's plan was to buy in the fall a bunch of cattle, big, lean steers and thin cows and heifers, almost anything with a large frame that might be made to carry meat. But to-day nothing is selected but steers of good beef conformation and weighing from 1,000 to 1,300 lbs., in the fall, steers that carry a considerable amount of flesh. Experience has proved that the fleshy steer is the most profitable to winter and makes better gains than the leaner one, and we rarely find a steer so fat from the grass that he will not stand a finishing spell with grain. These steers have usually been bought from some regular cattle buyer, a premium being paid for the privilege of selecting suitable feeders.

The steers are usually bought during October and allowed to run on the farms until hard winter sets in. As early as convenient after the steers are bought they

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are dehorned. Clippers are used for this purpose and a handful of lime is pressed on each stub to assist in checking the bleeding. With the approach of winter the steers seek the shelter and straw is drawn to them.

Many hold the opinion regarding shelter that the cattle retire into the bottom of some thickly wooded ravine or into some heavy bush where they would be almost as much shut in as they might be in some sod building without windows. Instead of this the cattle prefer the high open spaces, with just enough scrub to prevent the snow from drifting over the straw. The cattle enjoy the life and especially enjoy the sunshine so long as the winds are broken from them.

I wish to correct a wrong impression about the manure. Some seem to think that it would be out of the question to gather the manure among the scrub. Now if straw is fed in a comparatively limited open space, until it reaches a depth of two or three feet of straw and manure. it is not difficult to gather up. I know of no better way to convert large quantities of straw into useful manure than by feeding it liberally out of doors to grain fed cattle. In feeding straw it is necessary to use much more than the cattle will eat up clean, as by this means the cattle can always have a comfortable bed, and we aim to have the cattle comfortable.

About the 1st of December, or earlier, if the weather is severe, the cattle are given about four pounds of grain each day. The grain is all fed in the evenings in troughs about three feet wide, eight inches deep and raised about two and a half feet from the ground. The grain ration consists of a mixture of oats and barley chopped (barley principally) and bran, about one-third bran by weight. Finely ground chop gives best results and is most appreciated by the cattle. I usually feed about sixteen hundred pounds of grain per steer during the feeding period, and the ration is increased in January to about eight pounds per steer per day and during April to ten pounds. This is continued until about the 20th of June, when the steers are sold. If the grass becomes good in June less grain is needed at the finish.

In feeding cattle on such a dry ration, watering is of considerable importance. Those who are so situated that cattle can have access to open water at all times are especially favoured for this work; the cattle need to drink frequently and in small quantities. Where water is not so easily available it must be kept in the trough as constantly as the severity of the weather will permit, as a large drink of cold water following long abstinence would chill any animal and cause temporary check to digestive processes. In regard to salt, we usually place a barrel in some convenient place and knock the head in.

In carrying cattle until June, it is a great help if one has hay enough to feed for about a month after the snow goes, and by confining the cattle, so that they will not ramble too far, they can be made to at least hold their own during this trying period. The object in carrying cattle until June has been to wait for a profitable market. If the market, on say the first of April, was anything like equal to the market of June I am sure that good results would follow the feeding of the same total quantity of grain in the shorter period.

The steers are bought when cattle are at about the lowest, a premium over the market being paid for the privilege of selecting steers of approved type. In working out our balance sheet we have been in the habit of charging the grain fed to the cattle at the rate of 80 cents per 100 pounds. This we consider a fair price in an ordinary year. We charge interest, wages, and all necessary expenses and have been able with a margin of 1½ cents per pound between buying and selling price to make an average profit of about seven dollars per head.

In the Wheat Districts.

Many instances might be cited of men right on grain farms, who feed a number of cattle every winter, and of feeders who buy all their feed and still make money at it. A few extracts from the many letters must suffice:—

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J. R. Hume of Souris, on a section of land all under cultivation, feeds about 20 head every year, tied in stalls and never let out. Water in front of mangers; feeds oat and barley straw and oat and barley chop, increasing ration as period advances; Adds hay and pulped turnips towards the end of the period; sells about 24th May. As to profits he says: 'As near as I can tell they cost me about 4 cents per lb. when I have them ready for sale. I admit that there is not much money in feeding, but we have the satisfaction of knowing that the cattle consume a lot of stuff that has otherwise very little market value. Land that was manured four or five years ago, is still producing ten to fifteen per cent more grain than land that has been worked under the ordinary grain farming methods. I built a cattle barn with all the latest

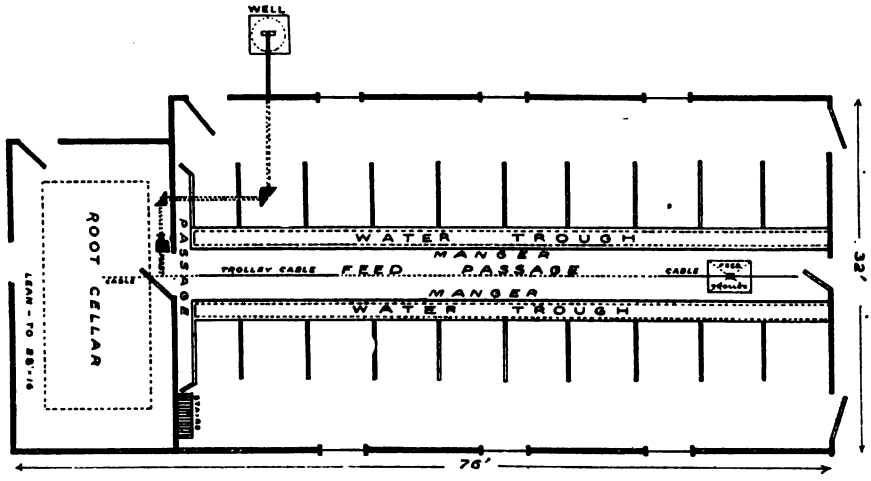

Fig. 53. Ground Plan of Barn Owned by J. R. Hume.

improvements, a hog and poultry house, besides nine miles of fencing, out of horses, cattle, hogs and poultry. Ask me if it pays to raise stock on a grain farm? I say 'sure it does.'

A. R. Speers at Griswold, Man., runs about 200 head a year and grain-feeds about 60 head, 'only the best bred and thriftiest'; the balance are sold off grass. He winters 60 to 70 head of younger steers in rough sheds on straw with a little hay towards spring, to finish on grass. During the winter of 1908-9, fed 30 head tied up and 30 loose. Mr. Speers feeds straw, barley preferred, oats next, till March 1, then native hay. He starts grain feeding with half gallon of chop, one-third oats, two-thirds barley, night and morning with half an oat sheaf at noon. After the first month the feed is increased to three quarts three times a day, and after March 1, one gallon three times a day. He grows all his own feed; does not feed roots, but would like to. The feeding period is six months and cattle gain from 200 to 225 pounds. He makes a profit of 1¼ cent increase over the feeder prices, but if well finished and sold at proper time generally gets 2 cents. Most feeders want to sell before seeding and consequently glut the market by throwing too many on at one time.

Joseph Donaldson of Brandon, buys his cattle, from 50 to 60 head a year, and all his feed for which he pays the following prices: Oat straw, $2.50 per ton; hay, $8 per ton; barley 35 cents to 40 cents per bushel. He does not use any other kind of feed. He feeds chiefly oat straw and a very little hay. The grain food is mostly barley chop, sometimes a little wheat, or oat chop mixed in; from four to six quarts twice a day. Water is in front of cattle all the time. He selects 2½ to 3½ year old grade Shorthorns, weighing from 1,050 to 1,250. He feeds tied up in warm stables and claims they do better and use less feed than if fed outside. The feeding period is

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five to six months; average daily gains are from 1½ to 2 lbs. The best season to sell is in May, and the best selling weights are from 1,300 to 1,500 lbs. He considers one should get 2 cents over the feeder price.

Cleaning Dirty Farms.

Some of the farms in the older settled sections have already become very badly infested with weeds. The soil may still be rich in fertility even though it is in bad mechanical condition and full of noxious weeds, and with proper cultivation will produce abundant crops of feed while it is being cleaned. Just how a man can make his living while cleaning up such land is the problem that confronts many.

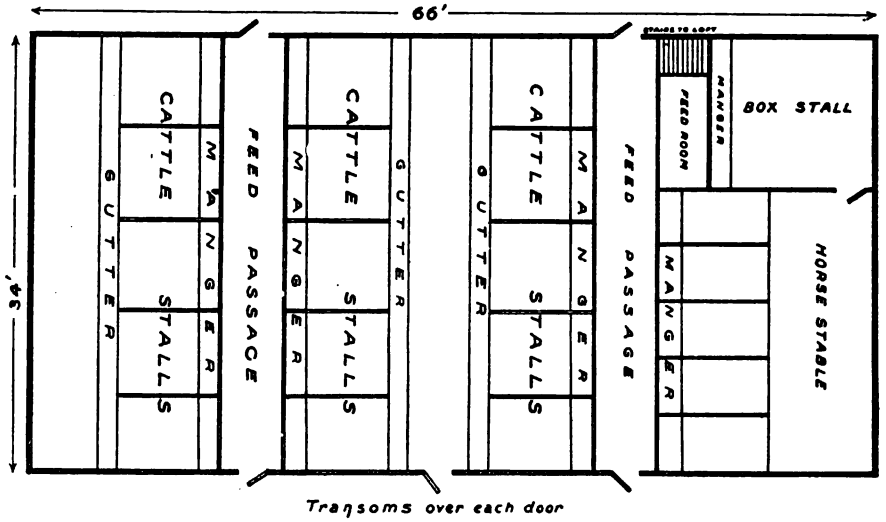

FIG. 54. FLOOR PLAN OF BARN OWNED BY WM. SHARP.

This barn is 34 ft. x 66 ft. with stalls for 30 head of cattle and 5 horses, and a loose box. It cost (four years ago when lumber was cheaper) including painting, but not including the hauling of the material, $,200. The sills are 8 in. x 8 in. tamarack; studding 2 in. x 6 in. fir; upper floor shiplap laid on 2 in. x 6 in. fir joists which rest on 6 in. x 6 in. tamarack girts, supported at stall partitions. The feature of special interest in this structure is the frame, showing self-supporting roof, which does away with the necessity of any posts to interfere with loft or use of hay fork.

Mr. Sharp says that, if rebuilding, he would make very few changes.

Mr. G. H. Bradshaw, Morden, Man., in the following letter describes how he makes steer feeding contribute to his treasury while 'cleaning a dirty farm':—

'We feed from ten to fifteen head each winter, preferring two and three year olds running in weight when ready for market from 1,100 to 1,500 lbs., Shorthorn, Hereford or Aberdeen-Angus are preferred in the order named. I have always fed in stable in box stalls. The cattle are dehorned and run loose, 6 in a pen 14 by 20 feet. I have found they do better than tied up. They have more freedom, get more exercise and rest better. Pens are cleaned out when convenient anytime once in two weeks to a month. Plenty of fresh straw given each day. The tramping of the cattle makes fine manure. Floors of pens are of cement concrete. As I have fine natural shelter, if I wanted to go into business more extensively I would build cheap sheds in a bluff and feed in the open instead of putting up costly buildings. I have fed very little straw, have used almost entirely brome hay, which I grow to clean dirty land. The grain ration consists of one-thtird oats, two-thirds barley, ground up till February 1, and barley meal entirely thereafter, which with the brome hay is very satisfactory. The meal is fed in troughs at the rate of half a gallon per head twice a day for two weeks to start with, increasing to three feeds per day; again increased at intervals of about

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two weeks till beginning of February, when each steer generally receives one gallon three times a day of barley meal. This amount is never exceeded and sometimes if steers are in fine condition rather less is fed. I have always raised all my own feed and use nothing else but hay and meal. Stock are turned out each day in sheltered yard for water and left out on fine days for a short time for exercise. Sometimes they are given their noon feed of hay or fodder in the open. If cattle are fed loose in pens, dehorning is necessary, and is done with least injury when they are about two years old. When tied up I don't think dehorning is any advantage. I generally put steers in early in November, and feed till sold, sometimes in March, sometimes not until May. As cattle were not weighed when put in I cannot give average gains.

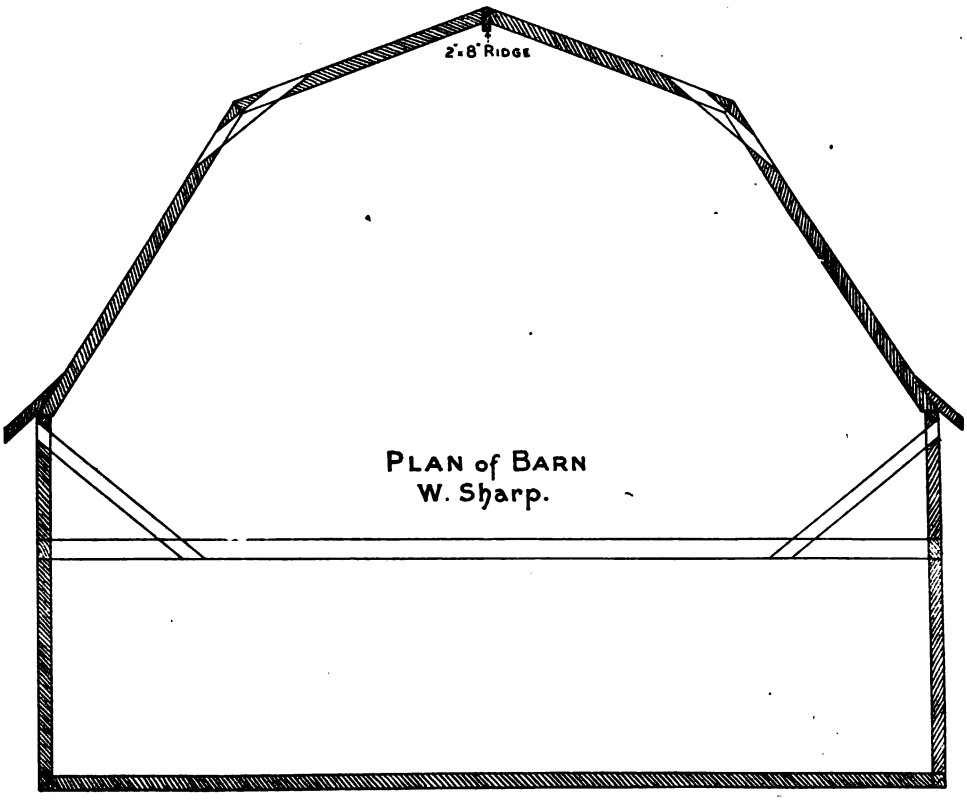

FIG. 55. INTERIOR BENT SHOWING SELF SUPPORTING ROOF.
(Barn 34 feet wide.)

I don't think there is any best season to sell. I fixed a minimum price of 4 cents for March delivery 4¼ cents for April and 4½ for May, and find that a margin of $1.50 per 100 pounds on bought steers just about pays for food consumed. In my case I have been cleaning a dirty farm and have taken this method of converting the hay and coarse grains grown in the process into money. The manure returned to the land has also helped considerably.

Buildings.

No attempt will be made in this chapter relating to cattle feeding in the north-western provinces, to discuss in any detail the question of cattle stables. The injury to the health and vitality of our domestic animals through the ill-ventilated and badly lighted stone basement barns of the older provinces is intensified a hundredfold in this climate. The basement stable and the stone wall should be condemned. Stables should

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be above ground, and ventilated so as to prevent dampness, and be well lighted. Let in the sunlight, let out the foul air and keep the atmosphere dry. It is not the cold that kills but the darkness and the damp.

Expensive buildings are not essential. In fact, in this dry climate, even very low temperatures do not adversely affect mature cattle, if provided with abundant roughage, grain and water. The latter is absolutely necessary; with free access to water cattle drink frequently, never taking large quantities at a time, thus their digestion is not interfered with and they do not get chilled as in the case when water is provided once or twice a day only.

Cattle fed altogether in the open acquire a thick and mossy coat of hair; do not bunch together as they will in sheds, and consequently never sweat and do not chill.

The liberty, exercise, pure air and sunshine seem to counteract the effect of lost body heat, and the steer fed outside, while possibly consuming more roughage, will make equal gains to the stall-fed steer with an immense saving in labour, and the capital invested in buildings.

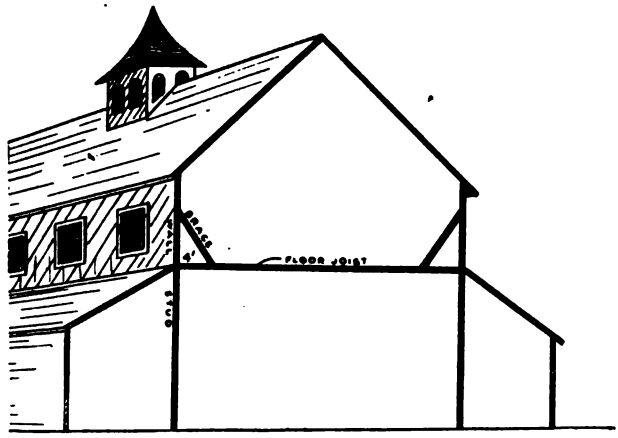

FIG. 56. SECTION OF BARN OWNED BY SIR WM. VAN HORNE SHOWING HOW LIGHT IS ADMITTED TO STABLE.

The lighting system here is ideal, a full row of large windows runs the full length of each side of the building. Braces run from floor joists to wall studs as per sketch, and the loft flooring runs up these braces, thus throwing the light right down into the stable. The windows at this height permit of a leanto which keeps the inner walls dry and warm while providing accommodation for feed rooms or splendid big loose boxes.

The flesh of such a steer is firmer; he is better muscled, and consequently should shrink less in marketing than the stall-fed steer, and be a safer shipper.

More attention should be paid to breeding.

Calves when weaned should be given better care.

Yearlings should be given some grain along with roughage the first winter.

A year's time might be gained in the turn over if the young cattle were better fed.

In the farming sections better pasture should be provided for the stockers. Rape sown on summer fallows provides splendid fall feeding and the tramping of cattle improves the condition of the fallow.

Stockers brought into winter in good flesh, wintered cheaply with some grain may be marketed early off grass when prices are nearly always high.

Summary.

The essentials to profitable cattle feeding are: A good steer, an unfailing supply of water, an abundance of good straw or hay and some grain chop.

For best results select well bred steers of the beef type, in good flesh, two or three years old (depending on the method of feeding.) Dehorned steers are preferable.

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Fig. 57. Cattle Barn on Farm of Sir William Van Horne, East Selkirk, Man.

Fig. 58. Farm Buildings of J. R. Horne, Souris, Man.

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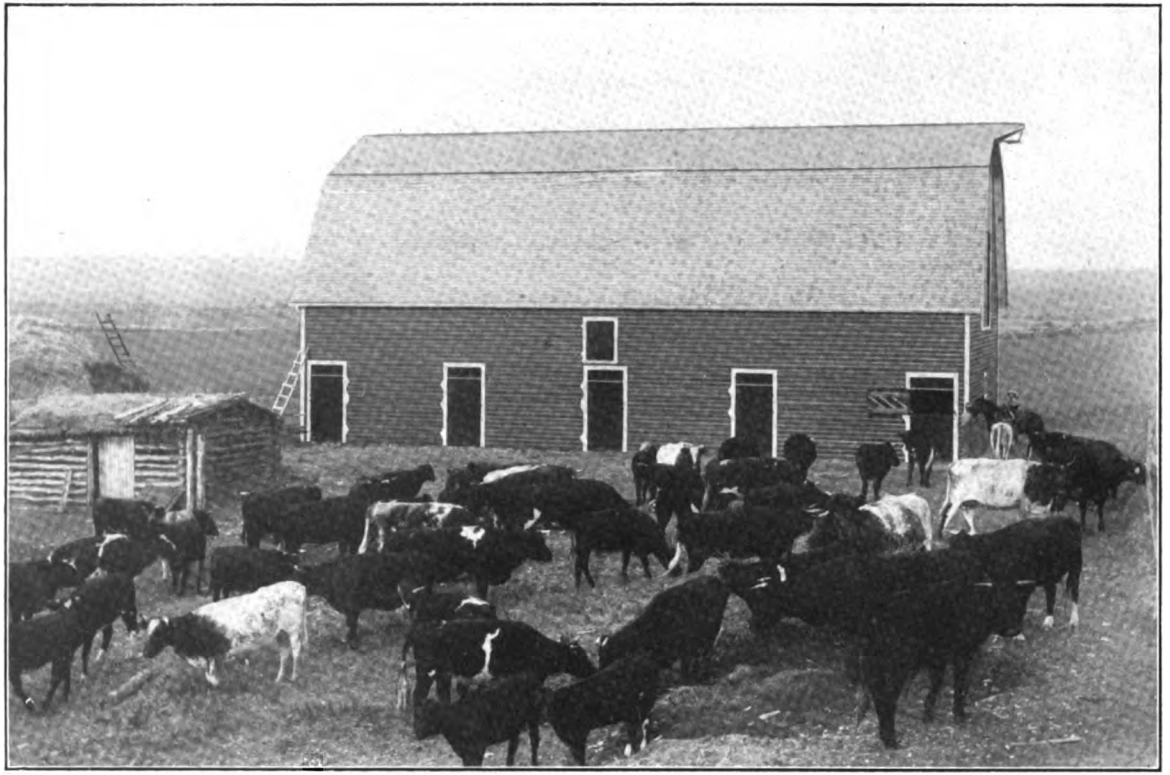

Fig. 59. Cattle Barn on Farm of William Sharpe, Lacombe, Alta.

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Profits may be made by feeding either tied up in stalls in stable, loose boxes, in open sheds and corrals or in brush shelter.

Profits may be made by feeding a short or a long period, on a limited or on a 'full' ration; on hay, oat sheaves, or good oat or barley straw, but water must always be available and the cattle well bedded and kept comfortable.

Grain finishing cattle in winter:—

Helps to relieve the market congestion in the fall.

Distributes shipping over longer period.

Supplies the market when most in need.

Provides market for fodder and grain which might otherwise be wasted.

Markets the farm bye-products on foot.

Tends to equalize the demand for labour throughout the year.

Makes manure, which properly applied, hastens the maturity of grain crops, and makes possible the preservation of the soil's fertility.

Markets the cattle when prices are highest.

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THE BEEF INDUSTRY OF BRITISH COLUMBIA.

By S. F. Tolmie, V.S., Representative of the Health of Animals and Live Stock Branches in British Columbia.

The first record that we have of the introduction of beef cattle into British Columbia was in the early forties when consignments were brought to the southern end of Vancouver Island by the Hudson Bay Company from their farm in what is now Washington State.

These animals were bred by the company for a number of years near Victoria and they supplied animals to many individuals who commenced farming in the neighbourhood.

During the time of the gold excitement on the Fraser river and in the Cariboo, in the sixties, a number of cattle were driven into British Columbia from Oregon, Washington and California for supplying beef to the miners. About this time several small herds were established in what are now known as the cattle range districts in the interior of the province. Under favourable climatic conditions, and with an abundance of feed, these herds increased rapidly and their surplus animals soon made a reputation for British Columbia bunch grass beef, which, for richness of flavour and fine quality, cannot be excelled anywhere.

For many years the ranchmen suffered on account of poor marketing facilities, often driving their stock for many days to some point on the Fraser river where it was possible to ship to the coast markets. Placer mining strikes at different points in the interior, from time to time, during these pioneer days provided the ranchmen with a good market while the excitement lasted, and some of them, who are now very comfortably situated, can trace the beginning of their prosperity to the market created by these early day mining camps.

With the building of the Canadian Pacific railway, matters were entirely changed, since then the ranchman has been able to dispose of all he can produce, though sometimes at prices not as remunerative as he would wish.

Of late years the beef industry has not been making much progress, and on the coast has practically been abandoned in favour of dairying, which, under existing conditions and prices, is much more profitable, giving the farmer a regular income, and, with the demand for dairy products at present, he is placed in a much more independent position when marketing his produce.

In many districts of the interior too, large tracts of what was once ranch land is being cut up for orchard and other purposes so that at the present time the British Columbia ranchman does not nearly supply local demand.

The first record we have of pure bred cattle coming to the province was in 1867, a pure bred bull coming from California in that year, more were brought from Oregon in 1873, and a consignment came from Ontario in 1874. As might be expected all of these were Shorthorns. There are at present several herds of pure bred Shorthorns and Herefords and one herd of Highland cattle. As far as I am aware there are no pure bred herds of Galloways or Polled Angus in the province. A few years ago there were several herds of Shorthorns of good quality at the coast, but of late years, these have been nearly all dispersed owing to the fact that the principal market for bulls is in the range districts where they prefer animals grown under range conditions. For this reason also the Ontario grown bull is not popular on the range. Pure bred range bulls sell for $60 to $100, according to quality.

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For close ranging, and on the smaller ranges where feed is more plentiful, the Shorthorn is preferred, while on the larger ranches where the animal's rustling abilities have to be depended on almost altogether, the Hereford has the preference. Yearlings, and upwards, are the age used and they are kept for about four years. One bull is turned out for every twenty-five or thirty cows and the calf percentage runs about 50 to 60 per cent. The calves are castrated in June and are weaned in November; they are usually fed hay all winter.

Thin cow stock are also fed some hay, while steers in this climate require some feeding about two winters in every five. Where feeding is carried on it is estimated that from 800 to 1,000 pounds of hay per head, consisting of clover, timothy and brome grass, will winter a mixed herd of cattle in fine condition under ordinary circumstances. Alfalfa is successfully grown in some districts where it provides an excellent winter feed; in other districts it winter kills badly. Under the above system three-year-old steers are turned off in the summer weighing from 1,200 pounds to 1,300 pounds, while cows run about 1,500 pounds.

Some years ago a few consignments of 'dogies' were brought from Ontario but they did not give satisfaction, and the shipments were discontinued.

Practically all the beef produced in British Columbia is marketed between June 15 and January 15, the price obtained being three cents for cows and three and one-half for steers at the railway shipping point. During the rest of the year the supply is obtained from Alberta. Much better prices would be obtained if the animals could be held over and marketed in the late winter and spring, but there is little prospect of this being done with hay running from $12 to $25 per ton.

A large modern abattoir has been established at Vancouver within recent years and many cattle are shipped there. The cattle buying and slaughtering business is falling into the hands of large concerns and the small retailer is rapidly disappearing

It is expected that with the opening up of areas suitable for ranching in the northern part of the province which are now being tapped by railways, that the range cattle output will hold its own, but little change can be looked for in the immediate future in the districts already settled as other lines of animal husbandry offer much larger profits than the production of beef under existing conditions.

Predatory animals do not cause much loss on the ranges. Occasional losses are caused by bears and panthers but these do not amount to much. Owing to the country being more or less heavily stocked with game little loss of live stock is caused by wolves, which are able to get their food in the forests. Coyotes are not credited by ranchmen with doing much damage. Some cattle men would like to see them protected on account of their destruction of gophers and other animals of a similar nature.

Range cattle here are practically free from disease. Tuberculosis is almost unknown on the range, while cattle mange does not exist in British Columbia. A small outbreak of Black Leg was reported last year in the range country but, this should be easily controlled by the use of the preventive vaccine now supplied by the Health of Animals Branch at the nominal price of five cents per dose.

Great improvement could be made in the cattle industry by the irrigation of larger areas of land for the production of alfalfa and other suitable forage to be followed by a more liberal system of winter feeding. This should be coupled with a careful selection of breeding animals and the use of only pure bred sires of good quality.

The beef cattlemen of the province should form an association and heartily co-operate with one another, bearing in mind that in unity there is strength. One of the first objects of this association should be to improve market conditions and to ensure graded prices according to the quality of their stock. Another matter that will need attention in the near future is the systematic re-seeding of the ranges with the valuable bunch grass which apparently will be exterminated in some places if some method is not soon adopted for its conservation.

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HOUSING.

The housing of cattle may be considered a necessary evil. Cattle would be better wintered out of doors were it not for the severe spells of weather which would cause suffering and loss. The disadvantages of the Canadian winter for cattle raising have undoubtedly been over estimated. In an effort to protect cattle against the climate it became the general practice among the more advanced stockmen some years ago to endeavour to maintain in the stable a temperature approaching June. In this the provision of nature to clothe the animals with a coat for the winter season was quite overlooked. Barns were built so close that they were kept warm from the bodies of the animals. Fresh air—the very life of live stock—was shut out, or so nearly so as to compel the inmates to breathe over and over again their own breath. The bank barn became a popular structure and was built as early and as expensively as the prosperity of the proprietor would allow. Many a farmer has burdened his business in order to build a stone basement barn, which, in later years, has come to be recognized as an enemy to the vigour of the herd. Actual experience has taught that the basement barn, as constructed with few windows and without provision for ventilation, is a failure and such are no longer built in progressive districts.

While as shown in the section of this bulletin for the western provinces cattle are being profitably fattened out of doors it is nevertheless necessary for best results to provide some sort of shelter for the breeding herds, young stock, and feeding cattle. Warmth, however, is not a necessity. So long as cattle are protected from cold winds, storms, and dampness, they will withstand moderately low temperatures without serious results. Nature supplies the necessary covering in a thickening and lengthening of the coat, provided the demand for it is allowed to assert itself naturally. In the prairie provinces, which have a dry atmosphere and plenty of sunshine, well grown, vigorous cattle thrive well out of doors if given shelter from the wind and a dry bed. In the eastern provinces the more moist and changeable climate makes outdoor winter feeding impracticable, so that for these provinces housing is necessary for all cattle during the winter season.

Good air, sunlight, and dryness are the chief considerations in a cattle barn. When to these are added convenience for work, economy of construction and maintenance, we have the essentials of a good barn. The shape is not important, provided it allows for the chief requirements. The round barn has its advocates, some prefer the square or rectangular form, while others again like the L-shape, or even two wings providing fine shelter for the yard. As a security against total destruction by fire two or more smaller buildings have advantages when separated by some distance. Undoubtedly the most popular barn for the cattle raiser has a basement, or lower story, beneath a roomy superstructure for storing food and bedding. Such an arrangement lends itself to economy of construction and convenience in feeding.

The lower story, which, for obvious reasons, should be built above ground, should not be less than 9 feet and need not be more than 11 feet high inside. The height of the superstructure will depend upon the storage room required, as modern fodder-lifting machinery overcomes height in filling. It is an advantage to build on a slight incline both for drainage and easy access to the barn floor. The wall should not, however, be built against a high bank. The back wall may be banked three or four feet high, provided numerous windows are arranged above it to let in the light.

Lighting.

The lighting of a cattle barn is of great importance, but it can in no measure take the place of ventilation. No disinfectant is as effective as sunlight in the destruction of microbes. Where light freely enters dirt and dust are likely to be removed. Cattle

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enjoy the sunshine and will choose it out of doors in a winter day before a close, dark stable. They need it for their comfort and health and the attendant requires it to enable him to keep the place clean and in order. Windows are as cheap as wall, and when double, they are quite as warm. To admit the maximum of light, windows should extend well down the wall. Bars or rods across the lower half will prevent breakage by the stock. While east, south and west, windows are most important, the north wall also should be supplied. It is hardly possible to admit too much light. About one-third of the wall above a line four feet from the floor should, when practicable, consist of windows. Nor should interior fittings be of such a nature as to obstruct the light. High partitions and feed racks are not necessary, and, as far as practicable, iron piping, or angle-iron, should be utilized for stalls. Heavy wire

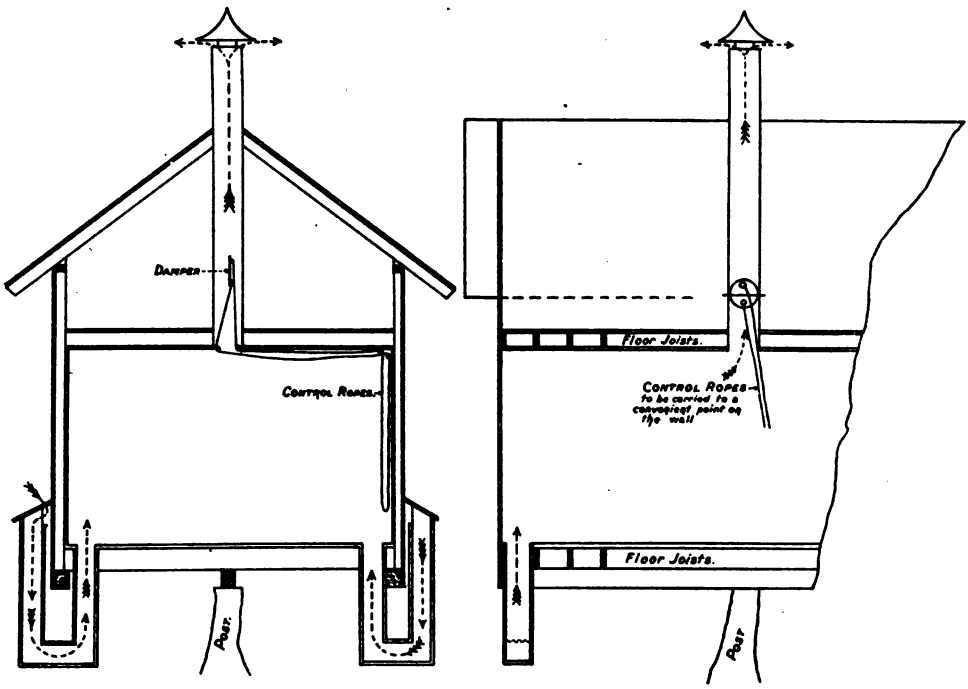

FIG. 60. THE RUTHERFORD SYSTEM OF VENTILATION.

Cross Sections, End and Side Views Showing Principle of System Designed and Placed in Practical Operation by Dr. J. G. Rutherford, M.A.R.C.V.S., C.M.G.

fencing for inclosing and dividing loose boxes is airy and substantial for young stock but bulls require more solid partitions. Such fittings not only allow the light to reach remote corners but also facilitate the working of a system of ventilation.

Ventilation.

Many experiments have been carried out to test the value of ventilation, more especially with dairy cattle, but also to some extent with beef cattle. In a test conducted at the Wisconsin Experiment Station it was shown that dairy cows lost weight, gave less milk and drank more water while stable ventilators were closed as compared with similar periods while ventilation was provided.

The test was with 20 cows and lasted 14 days. Ventilation was provided for two days and withheld two days until the last period when the tests lasted three days each.

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During each period of no ventilation each animal drank eleven pounds more water, lost fifteen pounds of weight and gave an average of ·55 of a pound of milk less per cow. They ate practically the same food under both conditions. The experience was the same for each period while the test lasted. At the end of the fourteen days the cows were turned out and, without an exception, every animal deliberately licked herself until not only the hair was removed in spots but sores were created. The itchiness was undoubtedly due to the overloading of the skin with impurities that could not be got rid of by way of the lungs. This kind of irritation and rubbing off the hair has been observed by every cattle feeder who houses his stock in warm, unventilated stables. Such a condition is never observed when stock are allowed the freedom of an open yard or have well ventilated quarters.

The cattle used in this experiment were vigorous milking cows, being well fed. They were accustomed to well ventilated stables. This, no doubt, explains the prompt response to the changed conditions; it also graphically indicates the evil effect of poor ventilation on animals even in healthy condition.

An experiment carried out by Mr. Grisdale at the Central Experimental Farm with beef cattle has even more valuable lessons for the Canadian cattle raiser. During one winter thirty head of steers were being fed in a building 35 by 42 feet, and without a system of ventilation. In another building, similar in every way to the former, except that it was well ventilated, was fed a similar lot of steers, taken from the same lot in the autumn. Both lots were fed and treated alike. In the spring it was found that the gains made by the steers in the poorly ventilated building were much less than those made by the other cattle. The actual difference amounted to a cost of about three cents per pound. The gains made by those in the poorly ventilated stable cost about 8½ cents per pound, while the others put on weight at a cost of 5½ cents per pound. Before the following winter a proper system of ventilation had been installed in the first building, and cattle were fed in both barns under the same system of feeding, with the result that both lots throve equally well, teaching the valuable lesson that it is a very expensive and wasteful practice to feed cattle in an unventilated building. This experience led to the installation of a good system into all the stock barns at the Experimental Farm.

An Approved System.

Contrary to the too general belief that windows can serve as ventilators, as well as to admit light, it may be pointed out that the best results are not secured unless a separate system of ventilation is provided in cattle barns. Ventilation by windows at times admits drafts and is too much influenced by outside temperature and the direction and rate of the wind. Various arrangements of sash to provide ventilation by windows have been tried but at the best without success. An independent system is needed, and that as simple as possible. A system that works under all conditions of wind and weather is what is required. Both inlets and outlets for the air are necessary and these should at all times perform the same functions. An inlet should always be an inlet and an outlet should never give trouble from downward currents.

For a number of years Mr. J. H. Grisdale has been experimenting extensively with various systems at the Experimental Farm. After giving practically all of the approved systems a comprehensive trial in both cattle and horse barns he has reached the conclusion that the 'Rutherford' system is the best. This system, invented a number of years ago by the present Veterinary Director General and Live Stock Commissioner; and found to work satisfactorily in the severe climate of Manitoba, is already fairly well understood. The principle upon which it works is that of the ordinary stove—the stable corresponding to the stove, the animals to the fire, the inlet to the front damper and the outlet for the foul air to the stove pipe or chimney. So long as the walls, windows and doors are fairly close, the animals raise the temperature, and cause the ventilators to work, and this in proportion to the requirements. That is to say, it is automatic in its action. The greater the number of animals and

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the closer the stable the more rapidly will the system operate. And this is what is needed, not only for purity of air, but for uniformity of temperature as well. In a close stable the degree of foulness of atmosphere corresponds with the temperature, as both are directly influenced by the radiation and breath from the stock.

Figs. Nos. 60, 61, 62 and 63 show the principle of the system. The air warmed by the cattle naturally rises and seeks an outlet. The outlet is necessarily at the ceiling and consists of a flue which passes through the roof. At the Experimental Farm the flues pass through an upper story. These should extend well above the building for the same reason that a chimney must do so in order to draw well.

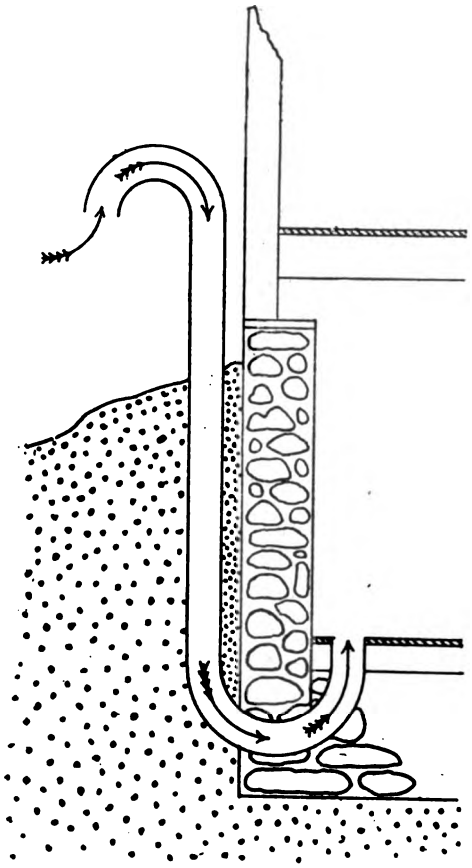

FIG. 61. SECTION OF WALL SHOWING PRINCIPLE OF INLET.

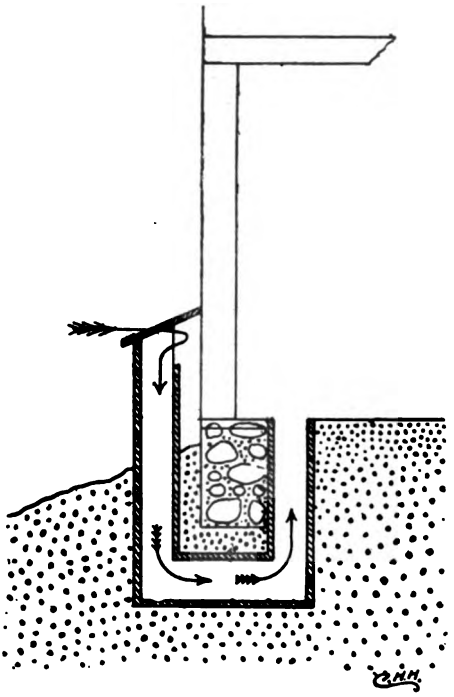

FIG. 62. SECTION OF WALL SHOWING FORM OF INLET USED AT THE EXPERIMENTAL FARM.

The inlets, it will be observed, enter the stable at the floor level. The inlet pipe is U-shaped and passes beneath the foundation wall. If the fresh air is taken from a covered shed the mouth outside may be near the ground level and be protected by a grating. If, however, the air has to be drawn from outside, more especially in districts subject to snow fall, the pipe should extend 4 to 5 feet above ground and the opening should be so arranged as to avoid the entrance of snow or rain, or undue influence from the wind. Fig. 62 shows the arrangement of the flue at the Experimental Farm barns. The roofed pipe is built against the wall, and the air enters through slots in the sides close against the building. The size of these openings corresponds with the capacity of the pipe outside.

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The ventilator works by virtue of the natural tendency of warm air to rise. As the air warms it becomes foul, rises and escapes by the outlets. As nature abhors a vacuum the escape of the warm, foul air creates a suction of fresh air by means of the inlet pipes. Since the animals are constantly giving off warmth, the warm, foul air is constantly escaping and cold fresh air is at the same rate entering the stable, thus keeping up a gentle, almost imperceptible system of ventilation. To regulate the ventilation a damper is provided in this outlet flue. The closing of this also stops to a large extent the inflow of fresh air as the draught ceases stopping the suction. By the original system the inlet pipe enters at the floor level. This is to facilitate a steady, unobstructed, almost imperceptible flow of air through the stable towards the outlets. To guard against chaff, and dust falling into the openings, Mr. Grisdale, in the new cattle barn at the 'Farm,' raised the openings about four inches above the floor level. He claims that it works admirably. It is important that obstructions at the ceiling be reduced to a minimum. All beams and joists should be ceiled over. Even a very slight rise towards the opening facilitates the passage of the air. While for convenience it is often necessary to place the inlets along the side or end walls and the outlets at intervals along the centre of the building, the ideal arrangement would be to follow the stove idea in placing the inlets at one end at the floor and the

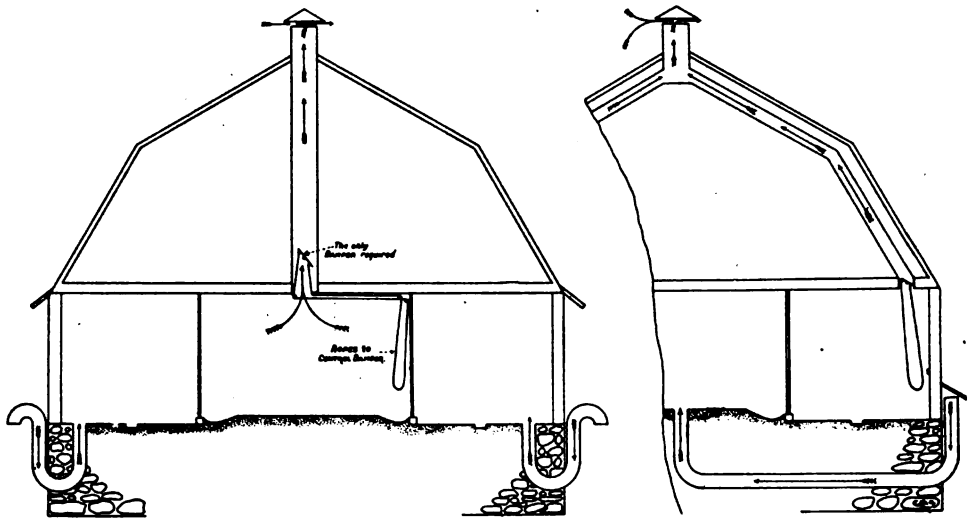

FIG. 63. CROSS SECTION OF BARN SHOWING HOW RUTHERFORD SYSTEM MAY BE INSTALLED IN A BUILDING ALREADY CONSTRUCTED.

outlets at the other end of the building at the ceiling. The warmed air would rise over the cattle, the outlets would draw it in one direction and that away from the inlet end. This would guard against the possibility of stagnant corners, or of air currents damming each other, and therefore insure a gentle, continuous movement of the atmosphere, with a corresponding purity of air and uniformity of temperature. At first thought it may be considered that a stable thus ventilated would be cold at the floor and warmer towards the ceiling. Contrary to this by actual tests with thermometers suspended at different heights it was shown that the temperature is practically the same at the floor as at the ceiling and at all intermediate heights.

The amount of ventilation necessary for a barn depends upon the number of animals to be housed. Sufficient is needed to maintain in cold weather a temperature of from 40 to 45 degrees Fahrenheit. A well built stable, stocked to a reasonable capacity, should have the air changed every 30 to 45 minutes. Air renewed at that

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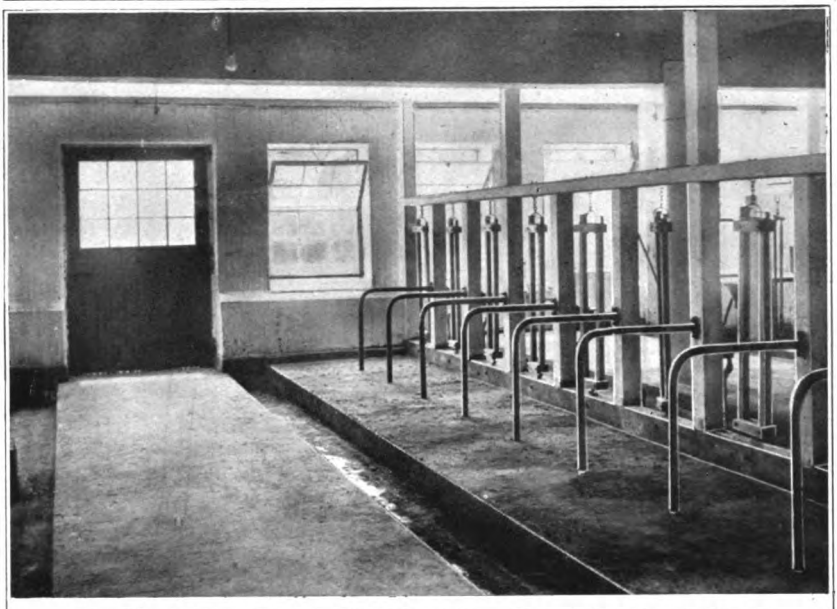

Fig. 64. Section of Interior Main Cattle Barn Central Experimental Farm. (Note provision for light and cleanliness.)

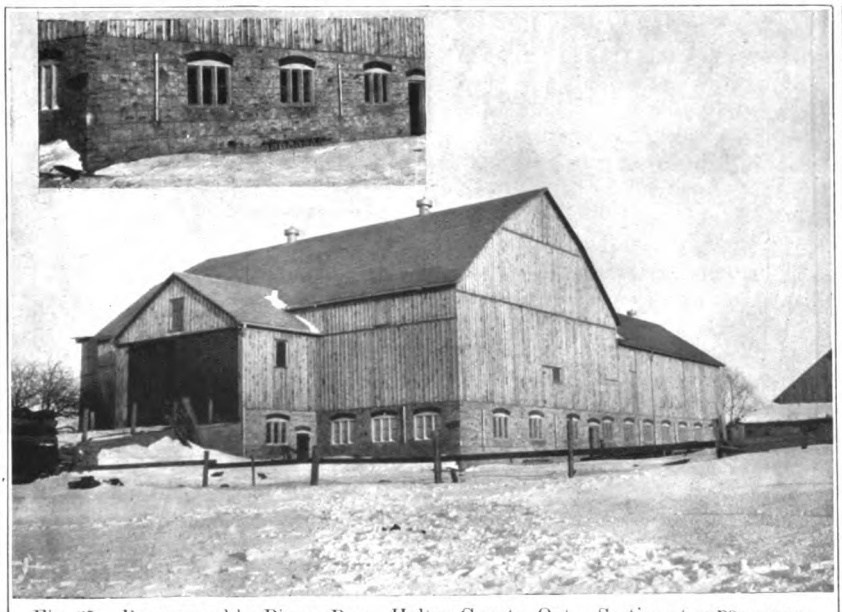

Fig. 65. Barn owned by Biggar Bros., Halton County, Ont. Section at upper corner shows windows, also galvanized metal intake pipes of ventilation system. Interior fittings same as Fig. 64.

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rate will carry off the foul air as it is expelled from the stock; it will also remove the vapour, which, if allowed to remain, would condense on the walls and ceilings. Objection has been made to metal flues on the ground that they drip and freeze up. When moisture condenses on the inside of a flue it is evident that the ventilation is insufficient, allowing the air to become unduly moist. It is well, therefore, to provide pipes large enough to admit of being partially closed by slides, or dampers, should the number of animals inclosed be reduced from the maximum that the stable would accommodate. In addition it is well to cover the ventilating flue with building paper and a close fitting wooden box or covering. This is a safeguard against cooling and condensation.

The intake and outlet flues should be about the same in capacity, that is, provided the stable is tightly constructed. Because more or less air is sure to enter around windows and doors, the intake may be slightly smaller than the outlet. At the Experimental Farm this system is in operation in the main cattle barn in which the milking herds are housed, a bull barn, a barn for fattening cattle and a horse stable. The main cattle barn, 120 feet by 50 feet accommodates one hundred head. It has three outlets for foul air each 2 feet by 4 feet, and nine inlets for fresh air, each 3 feet by 10 inches. The fattening barn, 100 feet by 30 feet, which accommodates 50 head of steers has two outlets, each 2 feet square, and three inlets each 3 feet by 20 inches. The bull barn, 100 feet by 30 feet has three outlets about 3 feet square and three inlets each about 3 feet by 20 inches. The bull barn outlets, although considered too large, are stated to work satisfactorily under average conditions. The horse barn which accommodates twenty-five horses, has two outlets, each about 2 feet square and three inlets each about 3 feet by 18 inches. In all these stables the ventilation is good under all conditions of weather.

Convenience.

The cost of securing suitable labour renders it highly important that a cattle barn be arranged so as to save time and steps in tending the stock. This state of affairs has done much to make loose feeding popular. This question is discussed at length under another heading. Every cattle barn should have a number of loose boxes, at least for calves and yearlings, and it is well to make provision for housing loose, at least a portion of the fattening stock. Quiet, dehorned cattle about the same age undoubtedly do as well loose as tied and require much less labour in feeding and removing soiled litter.

The location of the feed room is of chief importance. This should be convenient to the supply of roots, grain feed and coarse fodder. Whether it pays to mix ensilage with other feed is a question that each feeder must settle for himself, and will depend much on the location of the silo. For a barn only wide enough for two rows of stock the best place for the feed room is the end, but for a barn 50 or more feet wide it is more frequently located about midway of the stable at one side, usually at the back. This location is convenient for putting down cut feed from the barn floor, and being in front of the driveway to the barn does not obstruct windows. Where this arrangement obtains, more especially when the barn has a side drive, it is better to place the silo at the end of the building in order to avoid obstructing windows.

The introduction of modern feed and litter carriers have done much to solve the labour problem in the stable. No barn is complete without this convenience, which renders the location of the feed room of less importance than before these were introduced.

Permanence.

The destructibility of wood, and the increasing value of this material, renders it necessary to avoid using it as far as possible for foundation or flooring purposes. Cement concrete is not only comparatively cheap but easily worked, not only for walls

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and floors but it is well adapted for mangers, etc. Iron inside fittings well put in, carefully selected roofing material and the liberal use of paint on the outside not only improve the appearance of a barn but add greatly to its durability.

A Good Cattle Barn.

Many good barns have been constructed during the past few years. Figs. 65 and 66 represent a modern structure owned by Bigger Bros., in the county of Halton, Ont. This firm rear and feed off beef cattle and took pains in designing this barn to meet their requirements. It possesses the essentials to an unusual degree in the matter of convenience, light, ventilation and durability.

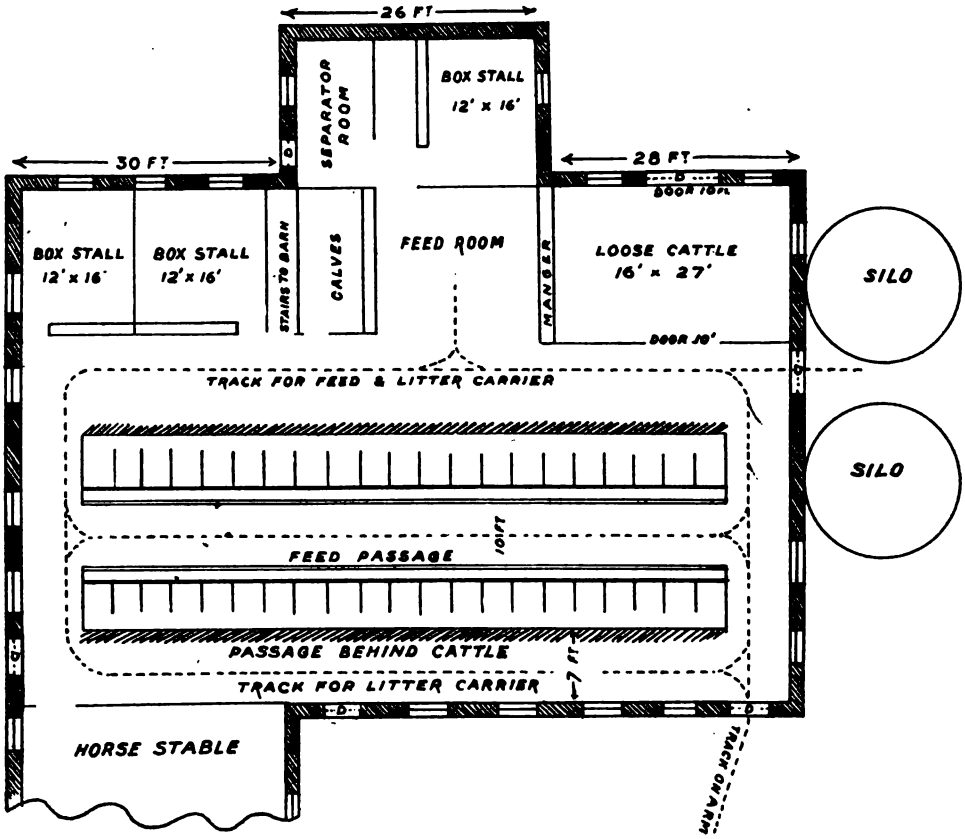

Fig. 66. Ground Plan of Cattle Barn Owned by Bigger Bros.
Stalls and floor same as Fig. 64.

The barn is 56 feet wide and 84 feet long. As shown by the floor plan it accommodates two rows of tied cattle and a row of box stalls. It has 500 feet of over head iron track, including 40 feet on a swinging arm in the barn yard for conveying feed and litter.

The silage is taken direct to the stock instead of being mixed with other food in the feed room. The litter is conveyed outside and dumped in the yard or into a sleigh or wagon to be hauled direct to the field.

Fig. 64 shows the stall plan. The manger consists of a trough running along the side of the raised feed alley. The tied cattle are fastened with swinging stanchions. The barn has a complete water supply provided by windmill power. Each two head of cattle have a drinking cup between them. The stall partitions consist of iron

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piping set in the cement floor. As shown by the size and number of windows the stable is well lighted. The stable, 56 by 84 feet, has nineteen windows, and the horse stable, 30 by 60 feet, has thirteen. Each window has six panes, 14 by 18 inches. The centre sash is hinged and may be opened on warm days. These, however, are not depended upon for ventilation.

The 'King' system has been installed. By this system the fresh air enters at the ceiling and the foul air escapes by flues which open about four feet from the floor. Fig. 65 shows perpendicular metal pipes attached to the outside wall. These inlets are four inches in diameter and connect with glazed tiles, which pass through the wall. The outlets are four in number, and are placed two on each side of the feed passage. These are carried to the roof where they are continued between rafters, each pair meeting at a metal ventilator shown in Fig. 65 above the peak of the roof. These ventilators are so constructed as to avoid the possibility of down drafts. The outlet air shafts are constructed of double lumber with building paper between. This is to keep them warm, to prevent the condensation of escaping moisture, and consequent dripping or freezing up.

The barn accommodates 40 head of cattle tied in stanchions and 16 head loose, besides two box stalls for calves. As shown it also has a feed room and a separator room and box stalls for roots or stock beneath the double driveway. Two circular

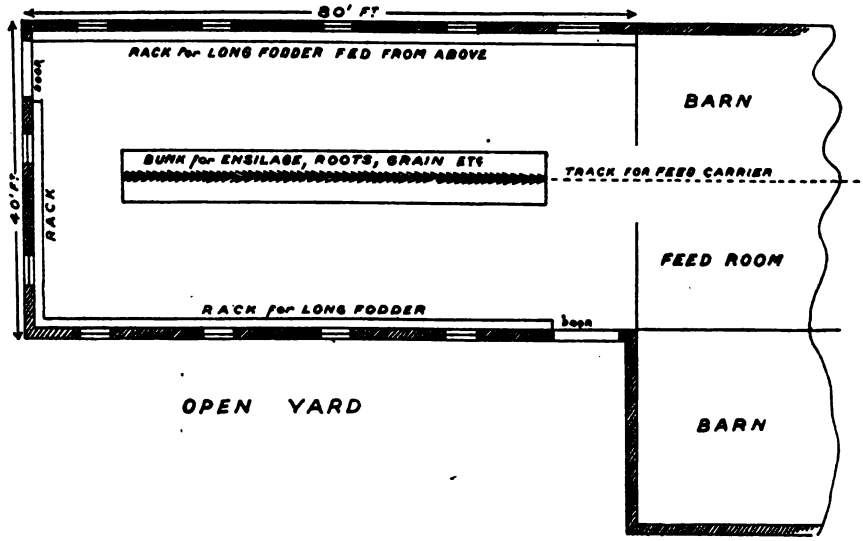

FIG. 67. GROUND PLAN OF SHED FOR LOOSE FEEDING, OWNED BY GEO. P. BARRIE.

silos stand at the east end. The stable walls are ten feet 2 inches high inside. The corner and side posts of the barn above are 18 feet long. As far as possible all doors slide on rollers. When visited on a severely cold winter day the temperature of this stable was about 45 degrees Fahrenheit, the atmosphere was fresh, stock comfortable and contented, and their skins were apparently in a healthy condition.

Shed for Loose Feeding.

In the section of this bulletin dealing with finishing beef cattle reference is made to the shed used, and system of feeding adopted by Geo. P. Barrie, near Galt, Ont. Fig. 67 represents the ground plan of Mr. Barrie's feeding shed. Above the shed is a feed loft connected with the main barn from which hay and other fodder are supplied to the racks against the walls for the cattle. The walls are of inch lumber

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lined and battened. The large door at the side is opened in the morning, allowing the cattle free access to the open yard until night. The walls, windows and ceiling admit of sufficient ventilation to prevent the temperature rising too high during the night, and, since the cattle of their own choice remain out of doors most of the day, this style of shed may be counted a success. In addition to being sanitary, comfortable and convenient to work in, it has the other important feature of cheapness of construction.

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MARKETING.

The market is the objective point of every live stock feeder. Unless one can see a return for his outlay and labour, he is not likely to continue fattening cattle. Fortunately there are consumers awaiting the beef, and since it is impracticable for the feeder to kill his cattle and prepare the meat for the urban dweller, and as the urban dweller cannot profitably go to the country for his cuts of meat; markets, abattoirs and shops have been brought into existence. Markets are thus a necessary part of the beef trade of every advanced country; and, the more valuable the live stock industry, the better the marketing arrangements. Beef raisers in certain sections may become justly impatient because of delay in providing marketing facilities; but, as the industry developes, well-organized markets naturally come into existence to meet the needs of both buyers and sellers. So long as a country produces chiefly dairy products, or principally wheat, the markets for beef cattle are sure to be slow in coming. But let the beef cattle industry grow and markets to take care of the supply are sure to come. They have come in the beef-raising provinces of Canada, and are year by year being extended and improved. In Toronto, Montreal, Winnipeg, and at other places, vast sums of money have been invested in fitting up yards and buildings for the selling and buying of stock. At these points, on certain days each week, buyers are on hand looking for stock and ready to pay for it according to values determined by the law of supply and demand. When the supply is short, the feeder has little difficulty in finding a buyer for his finished bullocks. During the past two seasons, owing to almost continuous good markets, many cattle have been coaxed away from their owners before they were fit to be marketed. Country buyers have been more insistent than usual, which has augured well for the cattle raisers, so far as the immediate price is concerned, but it has reduced the out-put of good cattle. To find a market has not been a serious problem to the man in a district where cattle of good quality are produced. Fortunately during the past season comparatively few periods of bad market conditions have been encountered. This has had an excellent effect on the trade. A well known general shortage prevented serious slumps, and confidence in the industry has been the result.

While keen competition for stock continues, the marketing problem will take care of itself fairly well for the man who keeps in touch with values by reading market reports and by paying occasional visits to the larger stock yards. The time will come, however, when supplies will reach a more normal condition, and then the country drover may neglect to make his weekly or monthly rounds. It is well, therefore, to do a little experimenting in patronizing the big markets. It seldom pays a feeder with only a few head to undertake to sell his own stock, although there is no reason why a bright fellow should not, after some experience, make as good a bargain as any one else. A man with a car load often sells; but, as a rule, it is more satisfactory to select a good commission firm, and consign stock to them. Many drovers deal with these men, knowing that they are in a position to get the last dollar for the stock. It is the business of these firms to find markets, and they must, of necessity, keep in close touch with all available outlets. They learn the requirements of exporters and butchers, and are always ready promptly to dispose of cattle of whatever class which may be consigned to them. Through these men many half-fat cattle find their way back to the country to be finished.

Just when to market cattle is a serious problem. While the good ones well finished always sell most readily and at highest price per pound, it is not always expedient to hold cattle until ripe for the best trade. One's supply of rough fodder

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must be a strong factor in deciding a matter of when to sell. It may or may not pay to buy concentrated food, but it seldom pays to purchase roots, hay or ensilage for beef making. Feeders, after considering the age, quality, and condition of their cattle, should decide, when putting them on a fattening ration, how long they should be fed, and then feed and market them accordingly. It is safer to do this one year with another than to follow the policy too often pursued of getting the cattle ready and then waiting for the market to become satisfactory. In times of normal supply too often the consequence of such a policy is a heavy run of stock and a serious drop in values just at the wrong time.

There are shippers in most beef-raising localities anxious to buy good cattle from old customers at a fixed price to go at a stated time. Many Christmas, Easter and May cattle are sold in this way. One must decide from his own judgment and experience whether it is better to sell in this way or ship to a commission firm when the cattle are ready. Neither plan is always better than the other. It is a fact, however, in so far as Ontario is concerned, that more and more export cattle are bought in Toronto instead of at the farms, as was the rule years ago. Exporting firms, that a few years ago had buyers going about the country, have withdrawn them, and now depend on the cattle coming to them at the Stock Yards.

It is the privilege and in fact, almost the duty—of the man who has cattle to sell to keep himself informed upon the condition of the market. He can do this by the market report, and by telephonic communication with his dealer; and, in addition, he would do well to visit the market from time to time to see how trade is carried on, the relative value of cattle of different classes, and make the acquaintance of men in the business. There is much valuable information a feeder can pick up during visits to a large market, especially if he accompanies a shipment of his own feeding with the purpose of interesting buyers in him and his cattle.

Grades of Cattle.

In a market like Toronto, Montreal or Winnipeg, cattle are graded as exporters, butchers, stockers, feeders, and canners. Butchers are subdivided into Nos. 1, 2 and 3. Exporters are not necessarily better finished, or worth more per pound than butchers, but they are usually a bit larger and heavier. A strong, fleshy bullock stands the shipping well, dresses out a good weight of beef, and it costs no more for ocean freight for a large animal than for a small one. Heavy exporters go chiefly to London, Liverpool and Glasgow, while many less heavy steers are taken to Manchester. Buying for this latter market is creating a competition for butcher's stock to the advantage of the seller. While there is still a large but decreasing number of unfinished grass cattle, more particularly from Western Canada, and known as 'ranchers,' exported to Great Britain, the great bulk of exporters are of good to choice quality, and weigh from 1,200 to 1,500 pounds. The selling value is more a matter of finish than weight. Top-priced steers exhibit a well-bred appearance, and carry sufficient flesh and fat to dress out from fifty-five to fifty-seven per cent of carcass.

The majority of cattle, exclusive of feeders and stockers, sold on Canadian markets belong to the butcher class. These are valued largely according to condition as regards finish. They are usually younger and smaller than exporters, and those of No. 1 class are quite as well finished and usually bring as much a pound. A 1,200 pound bullock that will dress out fifty-eight or more pounds of carcass to the live hundredweight will command a premium over the quotation for No. 1, which dresses out a smaller per cent of carcass. At no season of the year is the percentage of this class large, and this keeps up the price. From Christmas to June the supply is most generous, but during the remainder of the year grades two and three are by far the most common. No. 2 cattle are less well finished, dressing fifty-two to fifty-four per cent, while No. 3 includes thinner stock and lower grades, often showing dairy form and colours. Most butchers' cattle are slaughtered in the cities where

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sold, although a good number of cars go out from Toronto during the year for Montreal and intermediate points. In this age of large abattoirs and refrigerator cars, many towns that years ago were supplied by beef killed at home now depend on the large meat companies in Toronto and other points for their supply. This condition is centralizing the trade and building up yards, and improving facilities whereby buyers and sellers are brought together to deal in a thoroughly businesslike manner.

Stockers and feeders include calves, yearlings, two-year-olds, and older cattle that are to be sent back to the country for further feeding. Each is graded according to age, quality and condition. The younger class, usually weighing from 500 to 800 pounds, and known as stockers, are frequently bought to keep a year or more before they are ready for beef. Feeders are not only older and larger than stockers, but are, as a rule, better fleshed. Feeders under 900 pounds are not as popular as heavier cattle, and many bullocks more than half fat, that would make fairly good butchers' cattle are preferred, more especially in spring, to finish on grass for the June or July market. While such cattle cost high prices, if well bred and thrifty, they put on weight rapidly—forty to sixty pounds a month—and come back No. 1 beef, usually for export.

Preparing Cattle for Shipping.

It pays to prepare cattle for shipment in order to reduce as far as possible shrinkage during transit. Grass cattle should be yarded for a couple of days, and fed hay, preferably timothy, and if grain has been fed the ration of this should be reduced. A few day's feeding on dry oats, about five pounds a head, is recommended by good cattlemen. Water should be allowed constantly until the morning they are to leave the farm, and care should be taken to drive them leisurely to the station. This method will reduce scouring and shrinkage to a minimum.

Shippers need never load cattle into dirty cars. The law compels railroad companies to clean all cars before sending them out. Cars should be bedded with straw, sawdust, sand or other material, that will prevent the cattle from slipping or becoming sore. The expense of bedding the car must be paid for by the shipper. Cattle cars vary in size, and are charged for according to their length. It pays, therefore, to fill the car well, as no rebate is made for underweight, although extra weight is liable to be charged up to the shipper. Cattle ship better when fairly tight in the car, more especially if they are, as they should be, of about uniform size. A good load for a 36-foot car is from eighteen to twenty head. If the cattle are to be on more than twenty hours it is well to put 200 to 300 pounds of good hay in each car. If the car is not provided with racks, the hay should be strewn along the sides and ends where it is least liable to become trampled under foot.

Cattle that have been properly prepared and comfortably shipped will reach the market in a normal state ready for a drink, which will, with a good feed of hay, put them in attractive condition for the buyer. An excessive fill on the market is often detrimental to a good sale, as buyers detect such a condition, and are apt to neglect cattle so filled until late in the day, when they may have commenced to scour, lose weight, and look mean. Feeding grain in excessive quantities to cattle on the market is an unwise practice, and should be condemned. To secure weight by this method became a common practice on the Toronto market, until in February, 1910, when buyers issued a notice in which they jointly pledged themselves to refuse to buy cattle, which after arrival on the market, had been given any other feed than hay and water.

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THE PRINCIPLES OF FEEDING.

A feeder may place in his stables or feed lot, lean cattle of excellent type and have stored in his barns food of the highest quality and yet fail to profitably turn out high-class beeves at a profit.. That is to say he may administer the food in such a way as not to secure an adequate return for the food consumed. The successful feeder requires experience and when to this is added, either from his experience or the teaching of others, an accurate knowledge of the principles of animal nutrition he is well fortified to manage a stable of fattening cattle.

It is interesting to know something about the general composition of the body of farm animals. The amounts of water, nitrogenous matter, fat, etc. in a large number of animals have been determined by experiment stations and some of the general deductions which have been arrived at from these analyses will be given. In farm animals it is not uncommon for half the body to be composed of water. This proportion is largest in young animals, and as age advances the tendency is for the proportion of water to become less. During the fattening process the proportion of water in the body is reduced. Of all the solid constituents present, fat generally occurs in largest proportion, and this proportion increases very greatly during fattening. In the case of a fat bullock, fat might form about one-third of the carcass. The nitrogenous matter amounts to from 10 to15 per cent, and although its proportion tends to increase as the animal gets older, yet during the fattening process the proportion diminishes on account of fat being laid on at a greater rate. The ash of the animal body, or that which remains after the animal body is burnt, is very small, amounting only to about 3 or 4 per cent. The animal with the largest proportion of bone contains the largest proportion of ash constituents. It might therefore be roughly stated that a fat bullock is made up of about one-half water, one-third fat and one-sixth nitrogenous matter.

It is important to know the nature of the increase in young animals as compared with old, because here lies an explanation of the economy in early maturity. In the case of young animals, the increase consists largely of water and lean meat, while in the older or mature animals the increase is largely fat, and is of a drier nature. Thus it is that older animals are not so economically fed as younger animals; the higher proportion of lean meat in the increase of young animals is altogether in their favour.

In the case of the living animal there is constant demand for renovation of tissue, and, and in the case of fattening animals, for the production of increase; the heat of the body must be kept up, and energy is required for mechanical work. All these results are obtained from the food consumed and appropriated by the animal.

The solid parts of food are conveniently divided into albuminoids, fats, carbohydrates, and salts. These all have distinct functions in the animal body. The albuminoids contain nitrogen, carbon, hydrogen, oxygen and sulphur, combined together in complex fashion. These when consumed by the animal, and after being digested form the albuminoids of the animal body—hair, wool, horn, etc., are also produced from the albuminoids. In some cases fat may be formed from them and body heat and mechanical force may also be developed. Although fat, body heat, and mechanical force may be supplied by the consumption of albuminoids, it is advisable to let this part be supplied by the fat and carbohydrates, and preserve the albuminoids more for flesh formation. The power of albuminoids to form flesh (lean meat) hair, wool, horn, etc., is quite unique, as none of the other ingredients of the food have this power.

The fats in the food, after being digested and taken into the circulation, may be stored up as fat in the body, or, they may supply heat and mechanical energy to the

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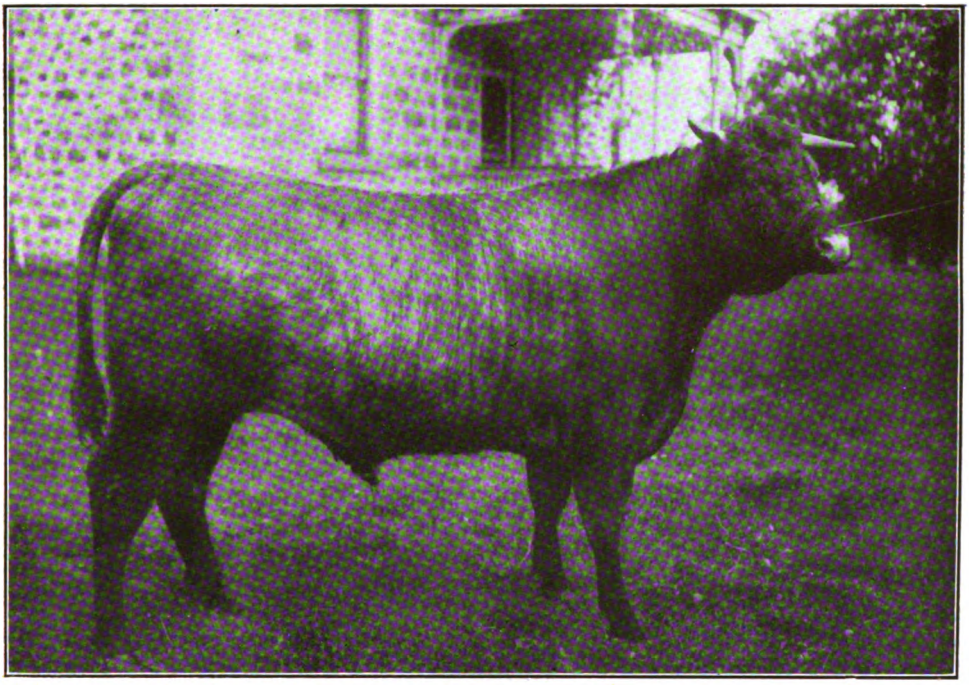

Fig. 68. No. 1 Export Steer, two years old. Weight, 1,400 lbs. Estimated dressed weight, 812 lbs., or 58 per cent.

Fig. 69. No. 2 Beef Cattle. Live weight. 1,780 lbs. Dressed weight, 943 lbs., or 53 per cent. of live weight.

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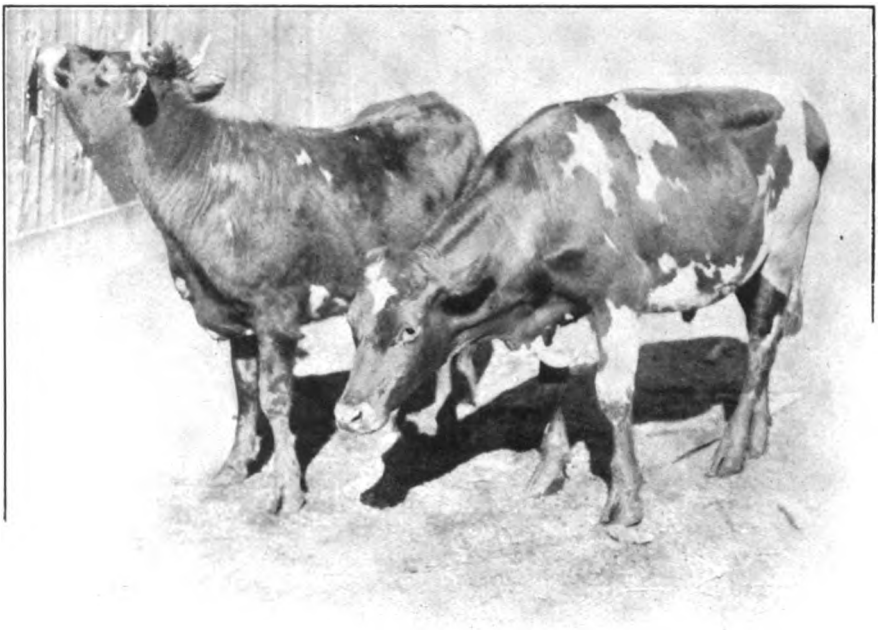

Fig. 70. No. 3 Beef Cattle. Live weight, 1,750 lbs. Dressed weight, 870 lbs., or 50 per cent. of live weight.

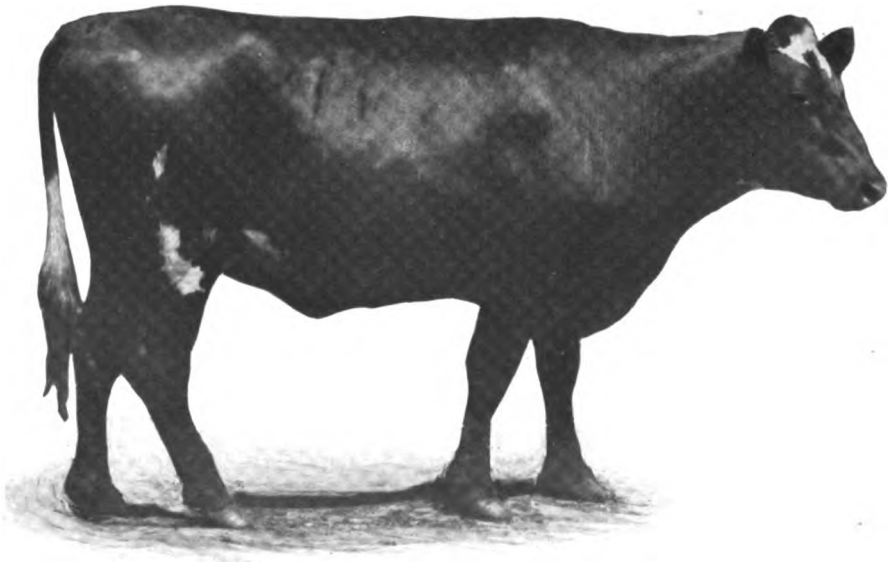

Fig. 71. A Good Butcher Heifer. Would dress about 53 to 54 per cent.

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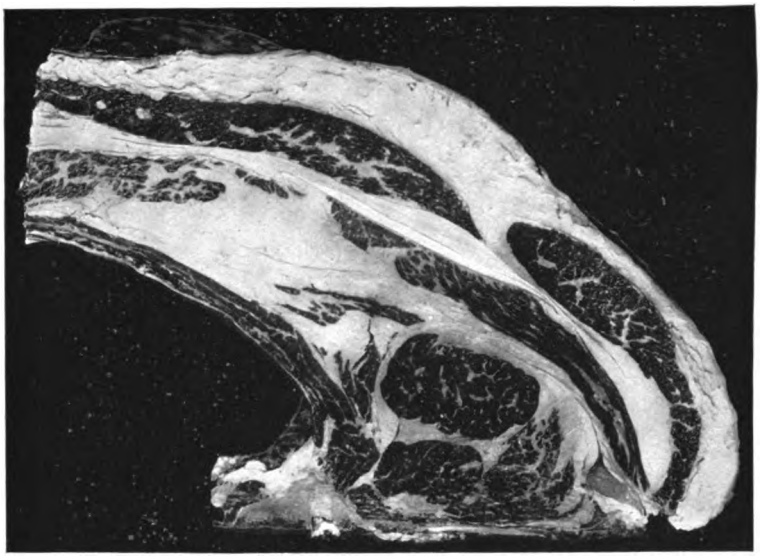

Fig. 72. Rib Roast from an International Champion Steer.
Total weight (four ribs), 30 lbs.; bone, 4 lbs. 4 oz.; meat 24 lbs. 6 oz. Meat of superior quality.

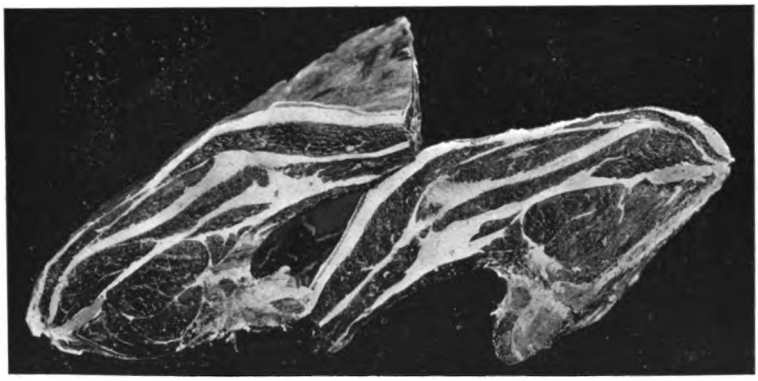

Fig. 73. Rib Roasts from Steers shown at Fig. 69.
Total weight (four ribs), 20 lbs.; bone, 5 lbs.; meat, 15 lbs. Meat of good quality.

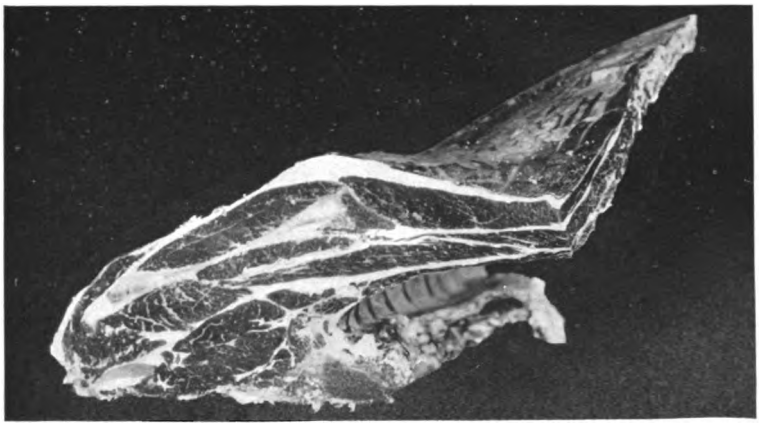

Fig. 74. Rib Roast from Steer shown at Fig. 70.
Total weight (four ribs), 17 lbs.; bone, 5 lbs.; meat, 12 lbs. Meat of poor quality.

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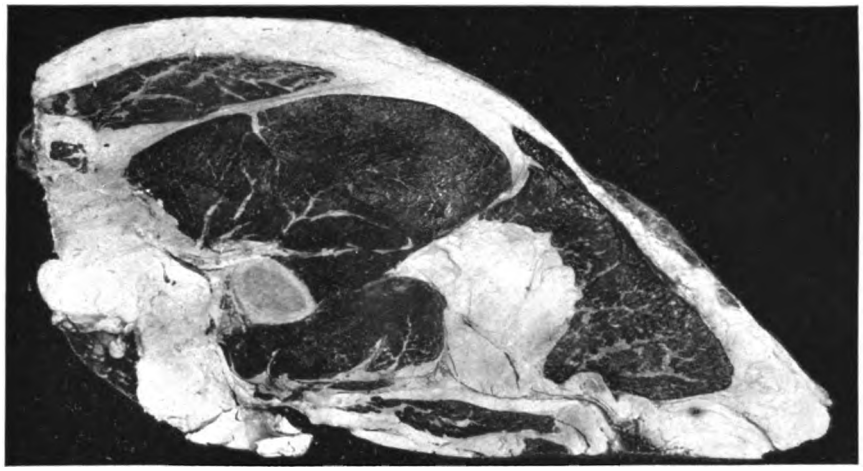

Fig. 75. Loin cut from International Champion Steer.
Total weight, 40 lbs.; bone, 4 lbs. 8 oz.; meat, 35 lbs. 8 oz. Meat of superior quality.

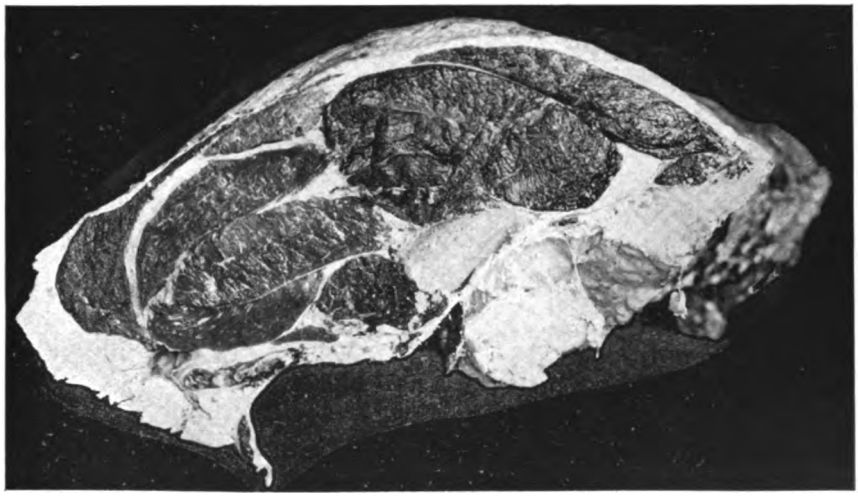

Fig. 76. Loin cut from Steer shown at Fig. 69.
Total weight, 30 lbs.; bone, 5 lbs.; meat, 25 lbs. Meat of good quality.

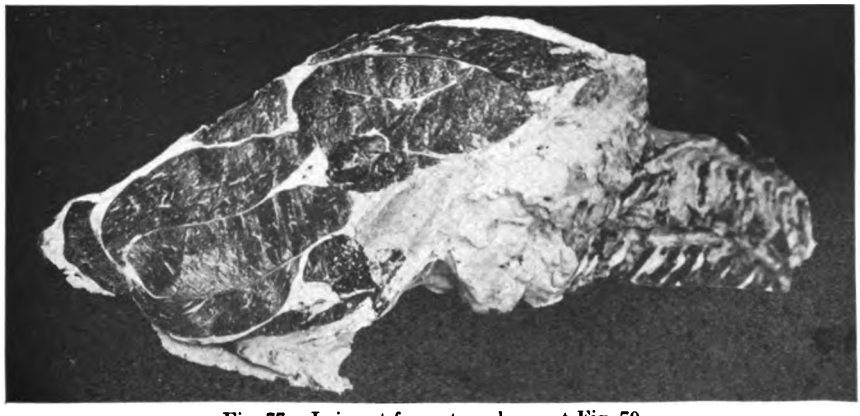

Fig. 77. Loin cut from steer shown at Fig. 70.
Total weight, 22 lbs.; bone, 5 lbs. 6 oz.; meat, 16 lbs. 10 oz. Meat of fair quality.

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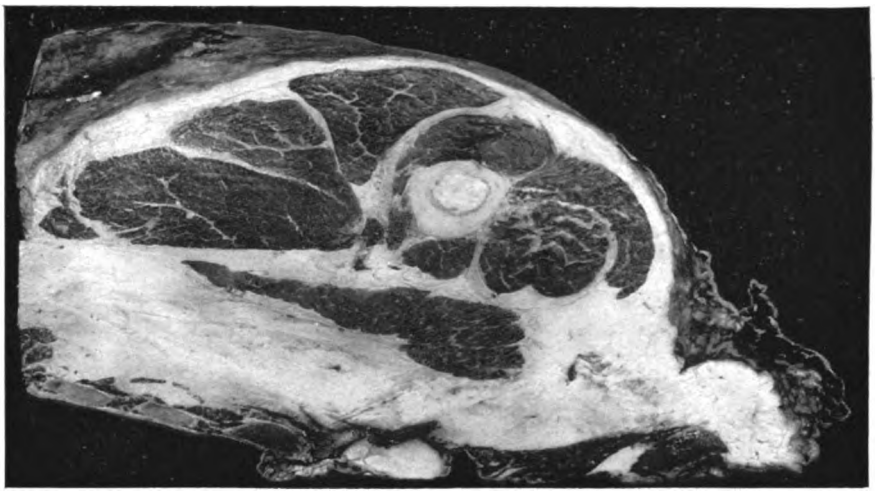

Fig. 78. Short Rib Roast from International Champion Steer.
Total weight, 60 lbs.; bone, 11 lbs.; meat, 49 lbs. Meat of superior quality.

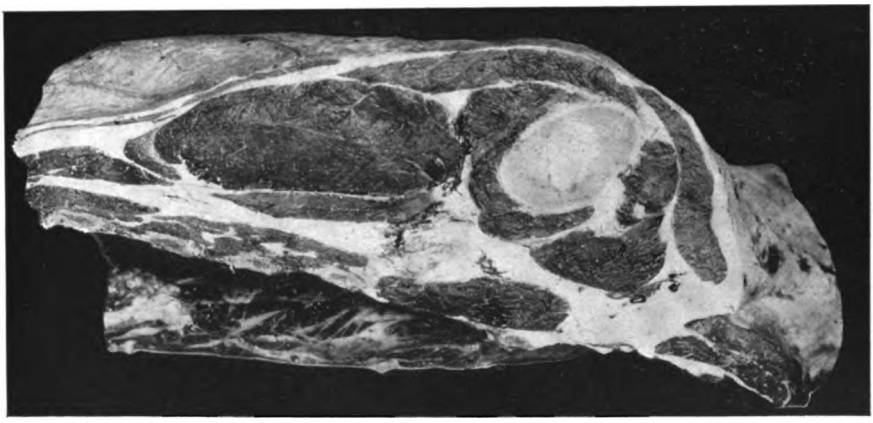

Fig. 79. Short Rib Roast from Steer shown at Fig. 69.
Total weight, 40 lbs.; bone, 12 lbs.; meat, 38 lbs. Meat of good quality.

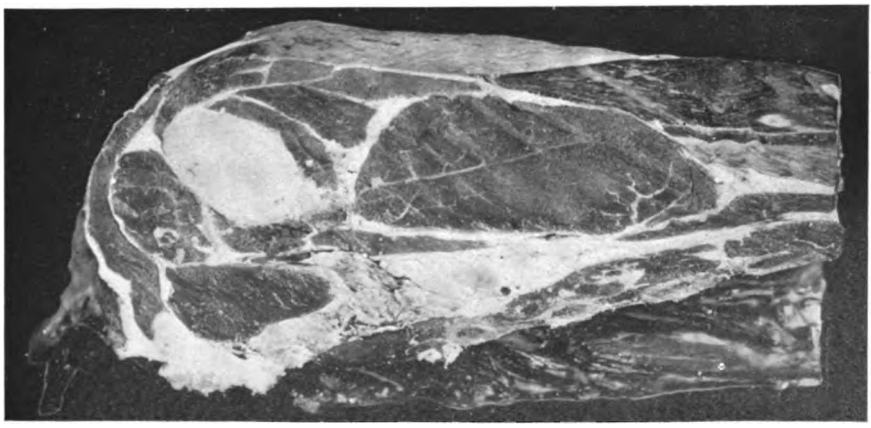

Fig. 80. Short Rib Roast from Steer shown at Fig. 70.
Total weight, 35 lbs.; bone, 12 lbs. 8 oz.; meat, 22 lbs. 8 oz. Meat of poor quality.

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system. As a heat and force producer fat has a higher value than carbohydrates. The fats in the food contain only carbon, hydrogen, and oxygen, and are quite incapable of adding to the nitrogenous tissues of the animal.

The carbohydrates, like the fats, contain carbon, hydrogen, and oxygen. These when taken into the circulation supply the animal with heat and energy capable of doing mechanical work. If fed in excess they may produce fat. The great thing is to have them present in the food in sufficient quantity to supply the body requirements of heat and work, and thus prevent the albuminoids from being used for this purpose. The salts in the food enter into the composition of bone, etc.

After learning the functions of the different constituents of foods, a brief account of the process of digestion will show how the food becomes absorbed into the circulation. In the case of the bullock the food is swallowed and remains in the paunch or first stomach for a time to soften and become mixed with the juices contained in it, then the food is thrown back into the mouth and chewed as cud. This chewing has the effect of mixing the food with the saliva, and gradually converting the starchy part into sugar by the action of a ferment in the saliva called ptyalin. The food now more or less fluid in character passes along into the fourth stomach, or the true digestive stomach, and mixes with the gastric juice secreted by it. This acts on the albuminoids and converts some of them into soluable bodies called peptones, by the action of a ferment called pepsin. Passing into the small intestines the bile attacks the food, and acts chiefly on the fat; and to complete the work the pancreatic juice acts on the carbohydrates, fats, and albuminoids, rendering a large proportion of the food soluable. The dissolved or digested portion is absorbed into the circulation largely through the walls of the small intestine and is carried by the blood to all parts of the the body where the different ingredients perform their respective functions. The heat in the body is produced by the oxygen of the air passing into the blood through the lungs and combining with the fats or carbohydrates in the blood. This combination or chemical change which takes place results in heat being generated and the animal body being warmed.

The value of a food is largely determined by four principal characteristics as follows: (1) Analysis or chemical composition; (2) Its digestibility; (3) Its palatability; (4) The purpose for which it is intended.

It has been pointed out that the important constituents of a feeding stuff are albuminoids, fat or oil, and carbohydrates. It is important to know to what extent these are present and in some cases it is also an advantage to know the percentage of fibre also. As to the relative value of albuminoids, fat, and carbohydrates, this varies according to circumstances. For the production of heat in the animal body oil would be about 2½ times as effective as either albuminoids or carbohydrates; while as a 'flesh former,' albuminoids alone would be effective. Although albuminoids may also give heat and force it is economical to prevent this as much as possible by using fat and carbohydrates in addition. In fact, each of these three ingredients has distinct functions, and should all be included, the important thing being to include them in suitable proportions. If relative values were allocated it would be approximately correct to give albuminoids and oil 2½ times the value of carbohydrates.

Digestibility.

The chemical composition alone may be no sufficient guide as to whether the ingredients are present in an easily digestible form, but the origin of the feeding stuff generally gives us some enlightenment on this point. Where a food is derived from a ripe or matured seed such as cereal grains, linseed, cotton seed, etc., the composition, as well as the digestibility will not vary seriously. It is foods rich in fibre, such as hay and straw which have generally to be watched. With hay and straw crops the ripeness at cutting time has a great effect—the riper it gets the larger is the proportion of fibre in the food, and this at the expense of the more valuable ingredients.

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Palatability.

It is highly important that a food should have an agreeable smell or flavour which causes the animals to eat it with relish. This is a value distinct from composition or digestibility. It excites the appetite and causes the animal to eat it eagerly. It also increases the flow of digestive juices. In some cases a food palatable to one animal may not be to another. The employment of some condiment or appetizer may be useful either where the animal has lost its appetite or the food has been slightly damaged. The value of these condiments is generally due not so much to the composition as to the possession of a particular odour or flavour.

A successful feeder knows the importance of having a food which passes through the animal system at a rate which is neither too fast nor too slow. Food which passes through too quickly is not likely to be so well digested as it would be if it passed through more slowly although it would be equally undesirable to have it passing too slowly. Certain foods have the power of regulating the rate of passage of the food, and on this account have a special value. These may be divided into laxatives and astringents. Some of the best laxatives we have are roots, grasses and oilcake, while very important astringents are straw and cotton seed meal. Good mild astringents are crushed oats and wheat bran. Then, again, where the basal ration is poor in any particular ingredient, the addition of a food rich in that ingredient balances the food, and often gives results greater than its composition would indicate. In addition, it would also be necessary to see that the food was in good condition.

In a bulletin of this character it is not practicable to enter into an elaborate discussion of the principles of feeding. In the foregoing sufficient has been stated to indicate something of the nature of foods usually fed to cattle and the principles of digestion and assimilation in the animal body. Those interested in a further study of the scientific side of the subject would do well to secure an authentic treatise such as 'Feeds and Feeding' by Henry; 'Feeding Farm Animals' by Shaw; 'The Feeding of Farm Animals' by Jordan; 'Profitable Stock Feeding' by Smith; 'Beef Production' by Mumford; or 'Feeding Animals' by Stewart. Such works are procurable from any bookseller or they can usually be obtained from the publishers of Agricultural Journals.

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DEHORNING.

Cattle as now reared and cared for are better without horns, which have come to be regarded as harmful appendages and useful only to the extent that they improve the appearance of animals wearing them. Many years ago cattle raisers conceived the idea of protecting the weaker animals from the stronger and vicious ones by removing the points of the horns or attaching brass knobs. Towards the end of the past century the entire removal of the horns became general practice in many sections. The success of this system, which has greatly simplified the tending and housing of cattle, has left no ground to stand on for those who would prevent the operation from a humane standpoint. Careful observation and investigation have demonstrated clearly that suffering caused by the operation on even mature animals is trivial as compared with the damage that even one mean old cow frequently commits on the other members of the herd in the field, the yard and at the watering trough. Before the advent of the practice of dehorning to house loosely horned cattle that were more than a year old was inexpedient whereas dehorned cattle of any age are run together at all seasons of the year with as little risk from injury from each other as sheep cared for under similar conditions. And yet dehorning is not as general as it ought to be. One feeder living in a remote district argues against loose feeding on the ground that the cattle would hook each other. To remove the horns from a pure bred herd of which the owner is justly proud might well be considered wanton disfiguration, but, to preserve intact the defensive appendages of a bullock is at least of doubtful wisdom.

Cattle are most easily dehorned during calfhood. Caustic potash is the usual agent employed while Gillet's lye does a satisfactory job. The action of these agents when properly used is to destroy the life of the horn in its early stage rendering the treated animal a smooth headed beast, deprived not only of the instruments of defence, but to a large extent the inclination to bully its mates. Dehorning by potash or lye is done before the animal is ten days old or as soon as the button-like embryo can be located on the calf's poll. The hair surrounding the spot is clipped off and the parts moistened with soapy water. When using the potash in the stick form it should be wrapped in paper to protect the hand and an exposed end moistened and rubbed gently on the buttons in turn for about five minutes or until they become sensitive and red but not to the extend of bleeding. Care must be taken that the dissolved potash does not run down the side of the head, or the skull may be seriously burned and permanently disfigured. If carefully done a scab soon forms, healing follows and the spot becomes covered with hair from the surrounding part. With some calves the operation may be done at four or five days of age while in others it is necessary to defer the operation for a few days longer. If treatment has been neglected until the calf is two or three weeks old the horns may yet be killed with Gillet's lye. The preparation of the horn is the same as for caustic potash. The powder is moistened and worked into a paste which is applied and rubbed well in with a knife blade or piece of wood. It is a safe practice to apply grease or oil to the skin around the horn to protect those parts from the action of the lye, but no oil should touch the part to be treated. The calf dehorned by either potash or lye should be kept from getting wet during three or four days following treatment so that the dissolved caustic will not run down and burn the skin. The calf will suffer some pain for an hour or two but no other inconvenience is experienced. Treated calves should be tied separately so that they cannot lick each other.

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Horned cattle not treatetd while calves may be readily dehorned by either an ordinary meat saw or dehorning clippers. The pain of such operation has been overestimated and the mortality is practically nothing. The exact loss of flesh due to excitement, loss of blood and pain, is difficult to estimate, as very much depends upon the skill of the operator, and perhaps more still, upon the temperament of the animal operated upon, nervous; irritable animals, suffering a greater set back than quiet, sluggish ones. In any case the loss is seldom great. At the Central Experimental Farm no great difference was observable in the effect of the different instruments used in dehorning except that there was but very little blood lost where the saw was used.

It is not advisable to dehorn in very cold weather nor should it be done during fly time. March, April, October and November are favourable months.

To secure an animal for dehorning a strong post or stanchion is necessary or, if much of it has to be done, it is worth while to erect a dehorning chute. For a small herd it does very well to use a stall partition post to secure the animal. The victim should be backed into the stall and its head securely fastened to the post. A lead ring attached to the nose takes the animal's attention from the operation. In addition a rope should be put on in such a way as to form a noose over the nose to give control of the head. A dehorning chute is simply a strong stall built in the yard with the forward end so arranged that the stanchion may be closed tightly on the animal's neck close to the head. The head when thus fastened should be not more than 20 inches from the ground. A noose firmly held completes the fastening.

Either the saw or clippers may be used and there is little to choose between them. The saw as a rule makes the neater job, but, the clippers perform the work more rapidly. Occasionally clippers crush the bone causing a slow healing. Unless the horns are taken off very close they bleed badly and stubs grow. The cut should take about one-sixth of an inch of the skin around the base of the horn and should be slanted with the natural slope of the head. Some animals bleed severely. To prevent this wind a piece of strong twine firmly around the head just below the horn bases so as not to interfere with the operation. Then tighten the twine by drawing together the upper and lower strands mid-way between the horns and fasten with a knot. Twine put on in this manner presses firmly against the large arteries. In a few hours the twine may be removed when danger from bleeding will have passed. Dehorned animals should not be allowed to rub against hay or straw stacks until the wound has healed. An application of carbolized oil or pine tar and lard after bleeding ceases will hasten the healing.

An examination of cattle from day to day in large markets proves that many cattle are badly dehorned, allowing stubs to grow out from the head. In many cases the stub turns down curving in penetrating the skin, even to the extent of creating a festering sore. This condition is objectionable for two reasons—1st. in causing pain and therefore reducing the gains by the animals; 2nd, cattle having ingrown horns are rejected for export. Almost every week a number of animals in export shipments have to be withdrawn and disposed of locally. While a small proportion of cattle thus turned back have not been dehorned, the great majority of them have been subjected to the process of dehorning which has been imperfectly done. A horn that is not killed or removed below the base will grow out an abnormal stub and is liable to turn in toward the head causing damage. In dehorning, therefore, care should be exercised to do the job thoroughly.

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ESTIMATING THE WEIGHT OF LIVE CATTLE.

Long experience in the cattle trade may enable a feeder or dealer to estimate an animal's weight fairly closely. At times, however, even the experienced are out when the scale is applied. The beginner, when the scales are not at hand, usually guesses either too high or too low. We have seen a 1,100 pound animal's weight variously estimated at from 850 to 1,250 pounds,—a wide difference of 400 pounds and that among farmers who had been raising cattle but usually selling per head in place of per hunderd weight. This is but one instance of the hundreds similar that have come under our notice in recent years.

Where the stockman does not have a scale the following table of weights based upon heart girth measurements will be found to give an approximately fair idea of an animals weight. The girth should be taken just back of the shoulder and forelegs at the place where the body is shallowest. This place may be found by drawing the tape back and forth a few times before tightening to take the measurements.

Heart Girth.		Store Cattle.		Fat Cattle.	
		Fair condition.	Good condition.	Fair condition.	Good condition.
Feet.	Inches.	Lbs.	Lbs.	Lbs.	Lbs.
5	0	650	700	700	750
5	1	675	725	725	775
5	2	700	750	750	800
5	3	725	775	775	825
5	4	750	800	800	850
5	5	775	825	825	875
5	6	800	850	850	900
5	7	825	875	875	925
5	8	850	900	900	950
5	9	875	925	925	975
5	10	900	950	950	1'000
5	11	925	975	975	1'025
6	0	950	1,000	1,000	1.050
6	1	1,000	1,050	1,050	1.100
6	2	1,050	1,100	1,100	1.150
6	3	1,100	1,150	1,150	1.200
6	4	1,150	1,200	1,200	1.250
6	5	1,200	1,250	1,250	1.300
6	6	1,250	1,300	1,300	1.350
6	7	1,300	1,350	1,350	1.400
6	8	1,350	1,400	1,400	1.450
6	9	1,400	1,450	1,450	1.500
6	10	1,450	1,500	1,500	1.550
6	11	1,500	1,550	1,550	1,600
7	0	1,550	1,600	1,600	1,650
7	1	1,600	1,650	1,650	1.700
7	2	1,650	1,700	1,700	1.750
7	3	1,700	1,750	1,750	1,800
7	4	1,750	1,800	1,800	1,850
7	5	1,800	1,850	1,850	1,900
7	6	1,850	1,900	1,900	1,950

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FRESH BEEF FOR THE FARMER'S TABLE.

In country districts, except where farmers co-operate to supply themselves with fresh beef, the meat diet of the people as a rule consists of pork, especially during the summer months. In certain favoured sections through the agency of the local butcher more or less beef is used throughout the year. Too often, however, the available supply of beef thus secured is of inferior quality, being cut from the carcases of old cows or lean cattle unfit to ship to market. When only such beef is available it is used more as a change than as the regular meat portion of the diet. Pork being easily cured and stored has of necessity become the meat food of the people. During the winter season the farmer is able to provide his family with well finished beef fattened in his own barn. At that season the meat can be kept fresh in good condition until used. It is during the more trying weather of summer that fresh meat is especially desirable. The difficulty of securing it has in many districts been overcome by a co-operative system whereby a stated number club together and furnish the animals to be butchered and distributed to the members throughout the season. The associations, which are known by several designations, as 'Beef Syndicate'; 'Mutual Beef Association' and 'Beef Ring' have memberships of from 16 to 40 members and run from a few months in summer, in some cases, to the entire year in others. The most popular membership is twenty and the length of season twenty weeks. To describe the 20 memberships' society will suffice to illustrate the working of the smaller or larger organizations.

A twenty-member beef ring usually runs for twenty weeks, each member supplying one animal during the season. The animal should dress about 400 lbs. which divided gives each member 20 lbs. per week. The beef is cut up according to a chart and each member gets a steak, a roast and a boiling piece each week. It is distributed in such a way that each member will have received all the cuts of a carcass during the season. In this way absolute fairness is meted out to all. In the case of small households, two members together, take one share between them, and of course provide only one animal. Should a member require and receive more than one regular share per week the matter is adjusted at the end of the season according to the price per pound fixed by the society at the beginning of the season. The usual price has for a number of years been about seven to ten cents per pound.

In some districts the sixteen-member ring is most popular, as less cutting is required, and in the case of small families a share between two gives a sufficiency. It has the disadvantage of running for only sixteen weeks in a season, or it may run thirty-two weeks by each member putting in two animals. A small animal dressing 320 pounds is killed each week. Some of the 24-member rings adhere to the 400 lbs. carcass which gives each member a weekly portion of 17 lbs. A ring of this size runs for practically half the year, commencing about the middle of May. The season in some societies commences on May 1 and for the first two monthts a beast is killed every alternatet week, and every week thereafter.

Winter is the best season to organize a society. Having secured a sufficient number of applications for membership a meeting should be held when officers should be appointed and rules and regulations endorsed. Following is a copy of the constitution of a working 'Beef Ring' having a membership of twenty.

Constitution of Beef Ring.

I. This association shall be known as the.....Association, and shall consist of 20 members, whose object shall be to furnish each member with his portion of fresh beef weekly during the specified season.

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II. That officers shall consist of a president, secretary and treasurer, whose duties shall be such as usually pertains to such offices; also, a managing committee of three members, whose duties shall be to provide a suitable place for slaughtering, settle all differences in regard to weight, and quality of animals furnished, and the general oversight of the work, and any vacancy occurring in any office shall be filled by a vote of a majority of members present at a meeting appointed by the society, as hereinafter provided.

III. The officers shall continue in office for the period of one year, unless otherwise determined by a majority of said society.

IV. The president and secretary shall be and are hereby empowered to convene all meetings considered necessary by them, and any special meeting at the request of any five members, given in writing.

V. Seven members shall constitute a quorum for the transaction of business.

VI. All persons becoming members of this society shall subscribe to the articles of this constitution, and will be governed thereby.

VII. The annual meeting shall be held at a place and on a day agreed upon, for the purpose of closing up the business of the current year, enrollment of members, election of officers, making arrangements for succeeding year's operations, and for the transaction of such other business as may be brought before the meeting, notice of which meeting shall be given each member by the secretary.

By-laws.

1. The society shall elect one of its members to the position of butcher (whose duties are hereinafter defined) who may engage some suitable person to perform said duties.

2. Each member shall furnish one heifer or steer, the age of which shall not exceed two years, and weighing about four hundred pounds, suitable for the purposes of the society during the season, in his proper turn, said season to consist of twenty weeks, commencing and ending at such times as may be determined at any regular meeting of the society.

3. The order in which each member shall furnish his animal shall be decided by lot at the annual meeting, or at a meeting held at least three months prior to the day of the first killing.

4. Each member shall deliver his animal at the place of slaughter at or before 9 o'clock on the day appointed by the society for the slaughtering of each animal.

5. Each member furnishing an animal shall be entitled to and receive the rough tallow, head and heart of the same.

6. The butcher shall be the judge of the suitableness of all animals furnished, and may reject unsuitable animals, subject, however, to an appeal to the managing committee.

7. The butcher shall weigh each carcass when dressed, and keep an account of the same giving proper credit to the member furnishing said carcass. He shall also cut and distribute weekly, to each member of the society, an equal portion of the same, as near as he can judge in the division, and keep strict account of the amount furnished each member per week, and at the end of each season settlements shall be made with the members of the society, in accordance with the accounts kept by the butcher and the price per pound agreed upon by the society.

8. The distribution of the butcher in accordance with the foregoing rules, shall be accomplished by placing each member's portion on hooks under their respective names at the place of slaughter, or at such other place as may be agreed upon by the society.

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9. The butcher shall market all hides and pay over to the treasurer the money obtained by him for the same, and shall receive for his services the sum of two dollars per head for all the animals slaughtered, cut up and distributed by him.

10. The money obtained by the butcher for hides shall remain as a fund in the hands of the treasurer for the purpose of defraying the necessary expenses of the society, and settling the differences of accounts between members at the end of each season.

11. No member shall have the privilege of withdrawing from the society without the consent of the majority of said society, and in no case will a member be allowed to withdraw until his accounts are settled with the society.

12. The above articles and regulations governing this society shall remain in full force and virtue unless amended by a two-thirds vote, after a notice of such amendment has been regularly given.

The System of Division.

The carcass is divided according to a diagram. The accompanying chart Fig. 81 of one side shows a very satisfactory system of division. The other side

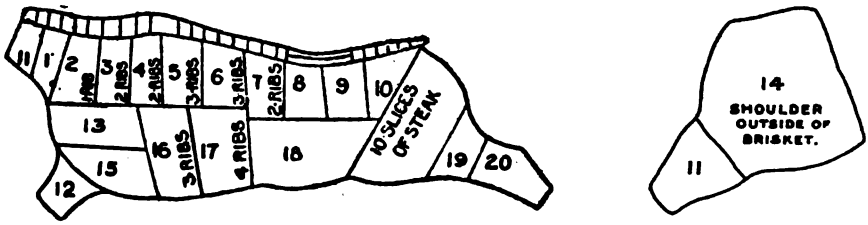

FIG. 81. DIAGRAM SHOWING DIVISION OF CARCASS FOR A TWENTY MEMBER BEEF RING.

or half is similarly divided. The following table shows a satisfactory combination of cuts for the different members:—

Roast.	Boil.	Steak.
1	13	1
2	14	2
3	19	3
4	16	4
5	17	5
6	18	6
7	15	7
8	12	8
9	20	9
10	11	10

Method of Coupling Cuts.

The above table shows the three pieces received from one-half of the carcass by ten members the first week of the season. The other half is similarly divided amongst the remaining ten members. On the second week, member No. 1 drops to No. 2 position and No. 10 takes the place of No. 1. This system is followed during the

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season. As a rule each member provides himself with two or more cotton bags of good quality each bearing his name. The portions due each member are placed in his respective bag and hung on the hook under his name. Thursday is the usual day for killing and the members go for their meat on Friday morning. With a proper cold storage the meat can be held until the members deside to take it away.

COLD STORAGE FOR THE MEAT.

While freshly killed beef, especially when taken from the carcass of a young and well fattened animal is much superior to salt pork during the warm months of the year it may be further improved by what is termed 'maturing on the hocks.' Beef properly 'hung' is improved both in flavour and tenderness, but more particularly the latter. This to the man living most of the time out of doors is of perhaps little importance as his appetite and digestion are usually good, but to some of the other members of the family tenderness is of some moment. In any case it is very generally recognized that beef improves by hanging in cold storage. Many of the first-class hotels and restaurants adhere to the practice of using beef only after it has hung in a temperature of about 34 deg. F. from four to five weeks. At this low temperature no alteration in the nutritive value of the meat takes place during such a period except that it is rendered more palatable and tender and therefore more digestible and nourishing. As the temperature of the storage rises the maturing, or fermentation, becomes more active and the meat reaches its best condition correspondingly earlier. Beef hung in a storage at 40 degrees would reach an excellent condition for consumption in about ten days and it should be very good at the end of one week. This is about as cold as would be practicable in an ice cooled storage such as a beef ring could profitably provide.

The best method of cooling food products by means of ice is found in the use of one or other of the modern styles of refrigerator in which the ice does not come into immediate contact with the materials to be preserved but is separated from them by a division wall. The meat is thereby not cooled directly but indirectly by the surrounding air. In the refrigeration of meat it is important to have the atmosphere of the storage as dry as possible for the reason that decomposition is hastened by moisture. In high altitudes where the air is extremely dry and pure, beef may be hung out of doors where it will not decompose but dry out thoroughly. At the sea level where the air contains a large amount of humidity meat in the open will readily decompose. It therefore follows that the system of refrigeration to be used should be that which tends to keep the atmosphere dry.

A Small Cold Storage.

A cold storage for a beef ring should be large enough to accommodate at least two carcases at once. Should the members all see fit to allow the meat to hang only one week the extra space would render the room more easy to work in or perhaps to store butter or other products. When an ice house is filled each year a small portion of it may be partitioned off as a cold storage room. With the ice properly packed on three sides and with good drainage, this makes a fairly satisfactory plan for keeping meat although it is by no means equal to a properly constructed refrigerator on account of its dampness.

A refrigerator suitable for use on farms and small butcher shops is described by the Dairy and Cold Storage Commissioner in a recent report. See plan and section in Fgs. 82 and 83. The ice chamber is comparatively small and has to be frequently replenished. The refrigerator proper, including the anteroom, the cold room and the ice box require to be exceedingly well built in order to provide for good in-

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sulation. The ice storage need not be expensively built as the ice can be protected by such insulating material as dry straw or sawdust on the sides and over the top.

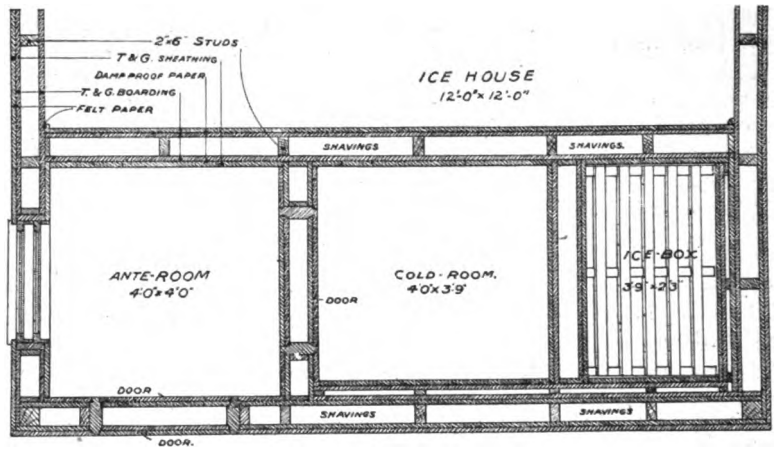

FIG. 82. GROUND PLAN OF COLD STORAGE.

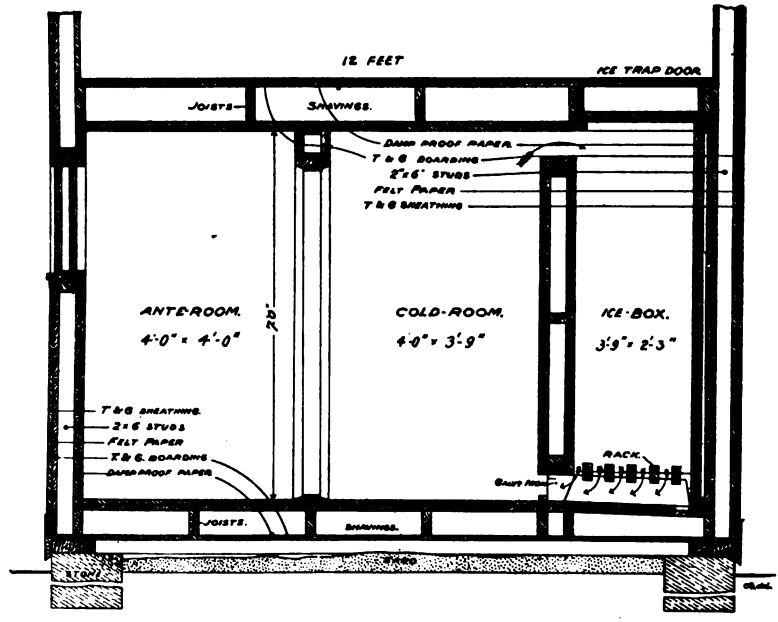

FIG. 83. CROSS SECTION OF COLD STORAGE.

The principle of refrigeration is based on the tendency of warm air to rise and of cold air to fall. This keeps up the circulation by which the air is constantly passing between the chunks of ice in the ice box. As the warm air reaches the ice from the cold room the moisture contained in it is condensed on the ice. This it will be understood keeps the atmosphere in the cold room not only cold but comparatively dry as well.

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The size of the refrigerator needed depends upon the use to be made of it. The plans shown provide for a cold room 4 ft. by 3 ft. 9 inches and 7 ft. high. This would easily accommodate two carcases each divided into four quarters. If a larger room is required a correspondingly larger ice box should be provided.

The ante-room is an important part of a refrigerator. This like the cold room should be provided with close fitting hollow or double doors. The ante-room and cold room doors should never be open at once nor should either be left open longer than is absolutely necessary or ice will be wasted. The ante-room may be used for cutting up the meat. Hooks should be placed on the walls to receive the bags containing the shares of the members.

Construction.

All lumber, except clapboards, should be tongued and grooved, and spruce only should be used for the ice box, cold room and ante-room. No tar paper should be used, on account of its strong odour.

The building will be better, and more permanent if placed on a stone or concrete wall. Otherwise it must be well 'banked' to prevent circulation of air underneath.

The extra course of lumber under the siding, also the dead air space, may be dispensed with on the walls of the ice house, *but not on the other parts of the building.*

The partitions between the ice chamber and the other compartments, and also between the ice box and the cold room, need to be well insulated, as shown, to prevent dampness. A poorly insulated partition against an ice chamber will become cold on the surface and consequently collect moisture. Many refrigerators and cold storages are failures from this cause. Emphasis is laid on this point, because thin partitions are occasionally placed between the ice chambers and the cold rooms, on the theory that refrigeration secured in this direct way is all that is needed. Dryness in a refrigerator is just as important as low temperature.

No roof is shown in the plan. That is left to the fancy of the builder. The construction of the ceiling should be the same as the walls and the corners must be thoroughly close.

Sufficient room must be left above the small compartments to allow of the blocks of ice being transferred to the ice box through the ice trap door.

The window in the ante-room has double sash, each sash being double glazed, giving four thicknesses of glass. Shutters are needed to keep out direct sunshine.

The floor under the ice box should be covered with galvanized iron, sloping in the one direction, with a gutter at the lowest edge to carry off the water from the melting ice. The drain pipe from the gutter must be trapped to prevent the passage of air. A simple plan is to have the end of the pipe turned down and extending nearly to the bottom of a small dish or vessel of any kind, so that the water will rise above the end of the pipe before the dish overflows.

Planing mill shavings are highly recommended for filling the spaces between studding and joists as shown on plans. They are always dry and do not become musty. If they cannot be procured, sawdust is probably the next best thing, but it should be *thoroughly* dried before being used.

The spaces between the studding around the ice chamber should not be filled. Any filling will eventually become damp from the ice, and damp material of any kind has very little insulating value.

Management.

As there is no floor in the ice storage, the earth beneath it should be well drained. The surface should be covered with 6 to 8 inches of broken brick, coal cinders, tan bark or other similar material of a non-conducting character. If nothing better can

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be procured broken or cobble stone covered with a layer of gravel or sand will answer. This material will make a good permanent bed.

Before filling with ice, 8 inches of sawdust should be put over the permanent bed. This should be renewed each year. The ice should be packed as closely as possible, filling all spaces with crushed ice well rammed. A space of 12 inches should be left between the walls and the ice, to be filled with dry sawdust. The top of the ice should also be covered with 12 inches of dry sawdust. If sawdust cannot be procured, hay or straw either cut or long may be used, but the space filled should be 18 inches instead of 12, and the filling well packed.

To utilize the cold room, fill the ice box with cleaned ice in lumps as large as convenient to handle. The box shown on the plans will hold sufficient ice so that it need not be filled often. The openings at the top and bottom of the partition between the ice box and the cold room may be fitted with a slide to regulate the circulation of air.

Particular attention must be paid to keeping the doors perfectly air-tight. A cushion of thick felt for the door to close against is about the best thing to ensure a good joint.

It is necessary to keep the refrigerator as sweet and clean as possible. It is advisable to use a liberal amount of sawdust on the floors so that drippings from the meat may be readily absorbed. The sawdust should be changed, at least those portions of it that have absorbed drippings, at least once a week. Care should be taken to keep doorways through which the carcases pass cleanly washed.

Killing and Cooling Beef.

Animals to be killed should be deprived of food from 12 to 20 hours during which time they should receive all the water they desire. They should be delivered at the slaughter house at least 12 hours before being slaughtered. The killing should be done in the evening and the carcass divided into halves or quarters and hung in an open shed or under a tree over night. A carcass so hung will lose the animal heat, that is to say, the temperature of the carcass will by morning have reached the temperature of the atmosphere. Early in the morning it should be placed in the refrigerator where it should remain until cut up and distributed.

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THE FUTURE OF THE INDUSTRY.

It is not only the optimist that predicts a bright future for the Canadian beef raiser. It is generally believed that years of low values have passed and that the cattle raiser who will give attention to the matter of producing bullocks of good quality need have no misgivings in regard to the demand for them.

The development and improvement of transportation and marketing facilities are bringing about a uniformity of values the world over. The countries, that, by reason of the nature of their industries, have to import beef, in a large measure decide the price. In such countries competitors from the ends of the earth meet and accept for their goods values governed by the law of supply and demand.

The reported shortage of cattle and marketable beef that has been evident during the past year has led certain meat trade journals to make the statement that the world is eating up its stock and that sooner or later a meat famine is inevitable. While such prognostications need not be taken seriously it is worthy of note that beef eating populations are at the present time increasing more rapidly than beef cattle. In the whole of Europe, including Great Britain, there were in 1878, 101,000,000 head of cattle, and these by 1908 had increased to 120,000,000. In the British Empire, outside of the British Isles, and therefore including Canada, India and Australia, the numbers went up during the 30 years from 13,000,000 to 23,000,000. Of the remainder of the countries of the world that to any extent carry on cattle raising there remain only the United States and certain South American countries. During the thirty years in question the cattle of the American Republic increased from 46,000,000 to 71,000,000, and of the Argentine from 22,000,000 to 29,000,000. The combined figures representing the number of cattle in these several countries, which include practically the whole of the beef trade, would show an increase from 190,000,000 to 259,000,000 in the thirty years. While these figures do not appear to indicate an early beef famine it is nevertheless true that the beef consuming population of the world has increased at a much more rapid rate. It is this relative rate of increase that concerns the cattle raiser, and this is most clearly demonstrated in the export movement of beef by the foremost cattle countries.

So far as Canada is concerned, Great Britain may be looked upon as the world's market, and her competitors in that market are the United States and the Argentine. From these three comparatively new, fertile, and extensive countries Great Britain has largely secured her fresh, unfrozen beef that could not be supplied at home.

Exports to Great Britain.

A careful study of statistics shows that the export trade in beef to Great Britain is rapidly shifting from North to South America, and if present conditions continue it will not be long before the United States will cease to be a competitor with Canada and the Argentine in the British market. The following tables show the numbers of live cattle and quantities of chilled beef exported by Canada, the United States and the Argentine each year since 1905:—

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IMPORTS of Live Cattle into the United Kingdom from Canada, the United States and the Argentine.

Year.	Canada.		United States.		Argentine.	
	No.	Value.	No.	Value.	No.	Value.
		$		$		$
1895	85,863	6,797,615	284,258	26,627,461	39,436	2,982,449
1896	97,042	6,816,361	385,350	35,932,727	66,699	4,496,038
1897	120,063	6,454,313	396,371	37,052,990	73,852	5,613,734
1898	122,106	7,403,990	342,689	31,668,909	89,369	6,576,926
1899	115,476	7,129,430	303,539	27,737,770	85,365	6,777,063
1900	115,056	7,579,080	423,181	33,819,164	38,562	3,248,389
1901	119,050	8,028,476	454,590	36,606,204	None	None
1902	148,927	9,742,738	327,118	24,301,969	"	"
1903	161,170	10,842,438	519,963	37,725,452	27,817	2,217,523
1904	148,301	10,046,651	599,180	41,415,729	None	None
1905	159,078	11,047,167	571,153	41,007,375	"	"
1906	163,994	11,045,463	494,366	38,273,132	"	"
*1907	149,340	10,200,137	401,583	33,796,425	"	"
1908	124,015	8,584,806	277,036	24,034,193	"	"
1909	143,661	10,115,793	184,957	16,274,250	"	"

* 9 months.

CHILLED BEEF Imported into the United Kingdom from North America and Argentine.

Year.	North America.	Argentine.
	Quarters.	Quarters.
1895	990,000	.....
1896	1,245,000	.....
1897	1,345,000	.....
1898	1,381,000	.....
1899	1,654,000	.....
1900	1,720,000	.....
1901	1,909.000	24,919
1902	1,374,000	94,498
1903	1,616,000	142,542
1904	1,438,000	198,300
1905	1,339,000	402,195
1906	1,456,000	454,613
1907	1,451,000	427,042
1908	859,000	767.284
1909	521,000	1,066,134

As will be noticed the chief feature of the above tables is the rapid shrinkage of exports by the United States. Not only have the exports of live cattle reduced in volume, but the quality during the past year has not been up to the standard of earlier seasons. The change in this particular was especially marked during 1909 when the cattle sent were of the coarser and commoner grades. The reason for this was that prices in the home market were higher than in the British market for the best class of stock. The volume of exports of dressed meat from the United States has declined even more rapidly than live cattle. All this is due to the increasing population, expanding industrial activity at home and the decline in cattle population.

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Whether or not the improved values will greatly increase the beef stocks of the United States is a question yet to be decided. Those in a position to judge of the future look for the home demand to quite overtake the supply within a few years. Packing house magnates, who have established retail shops in Great Britain and have supplied them from their own abattoirs, appear to see the handwriting on the wall, and already have established plants in the midst of new sources of supply. At Edmonton, Hamilton and Winnipeg, Chicago firms have in operation large packing houses, and at Toronto, the Union Stock Yards have been taken over by a Chicago firm. At the latter point buyers representing some half dozen large United States firms are on hand from week to week to bid for the offerings of export cattle. During the summer months of 1909 through the agency of these buyers more export cattle were shipped from Toronto than from any other point in America, Chicago following next in order for this period.

It is in South America that Chicago firms are extending their business most rapidly. Two of the strongest corporations already have in operation in the Argentine extensive chilling and freezing plants, and are expanding their operations so rapidly as to give currency to the opinion that they are on a fair way to acquire controlling power of Argentine meat supplies.

That the Argentine Republic occupies a favourable position in regard to its future beef production is already demonstrated. Its immense areas of rich, grazing and farming lands, well adapted to the growing of the finest of cattle foods, including alfalfa and corn; its large herds of breeding stock, graded up with the blood of the best British Shorthorn and Hereford families; its temperate climate, rendering the housing of growing and fattening stock unnecessary; and, withal, its enterprising and wealthy stock owners make a combination not possessed by any other country.

As shown by the above table upon exports of live cattle, the Argentine made a creditable beginning in sending cattle to the British market, which trade was stopped short because of disease in Argentine herds. No sooner had this been accomplished than they commenced to ship fresh beef in chilled condition, and to-day they have steamship facilities by which chilled beef is delivered in Great Britain in merchantable condition. The table on chilled beef shows how that country overtook in 1908, and surpassed in 1909, the exports of this product from North America, which means the United States. Indications are that the Argentine Republic, on account of its country, stock and facilities, will very soon dominate the chilled beef supply of Great Britain. With the termination of exports from the United States the demand upon the Argentine will so increase as to quickly show itself in improved values, which will assure the continuation of good prices for beef cattle, not only in the Argentine, but also in competing countries including Canada.

A phase of the question which should not be overlooked is the uncertainty of the supply from South America. As is well known the Argentine is subject to severe droughts, but, against this, must be set the adaptability of much of the country to irrigation. Then the Republic of Uruguay is looming up as a cattle country. It possesses fine grazing lands and much attention is now being given to the improvement of its cattle, of which it has some five million head which are not run in large bands, as in the Argentine, but in smaller herds, as in Canada. This country has already entered the list of those exporting beef and may yet assume an important position in this regard.

The Situation in Canada.

Canadian beef cattle raisers have not been more wise than their neighbours to the south in the matter of keeping up their breeding herds. Both in Canada and the United States during the years 1908 and 1909, when industrial advancement and increase of population were unusually marked, the beef cattle stock has been allowed to fall even behind that of previous years. Figures representing cattle, other than

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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
Branch of the Live Stock Commissioner

HORSE BREEDING

AND

REARING OF COLTS

BY

J. G. RUTHERFORD, C.M.G.

Veterinary Director General and Live Stock Commissioner

BULLETIN No. 14

PUBLISHED BY DIRECTION OF THE HON. SYDNEY A. FISHER, MINISTER OF AGRICULTURE, OTTAWA, ONT.

MAY 1, 1911

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OTTAWA, May 1st, 1911.

Sir,—I have the honour to present herewith a series of short articles on Horse Breeding and the Care of Mares and Colts, which I have prepared in the hope that they may be of some value to farmers interested in this particular branch of animal industry.

I would recommend that these should be printed in bulletin form for general distribution.

I have the honour to be, Sir,
Your obedient servant,

J. G. RUTHERFORD,

Veterinary Director General and
Live Stock Commissioner.

To the Honourable
THE MINISTER OF AGRICULTURE,
Ottawa.

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HORSE BREEDING

AND

REARING OF COLTS

THE BREEDING OF HORSES.

It is an old and true saying, never truer than it is to-day, that "there is always room at the top"; and this applies, not only to the human race, but to all the various species of domestic animals. Thus while the individual who breeds and raises scrub stock may, and doubtless often does, find considerable difficulty in disposing of his surplus, the man who successfully devotes his attention to the production of a first class animal is seldom found complaining for want of a customer. While this is true of all kinds of stock, it is for obvious reasons especially the case with regard to the horse; for while the beef from a scrub steer, the mutton from a scrub wether, the pork from a scrub hog, or the butter from a scrub cow, while not so remunerative as similar products from specially adapted animals, will, if of fair quality, generally find a purchaser, the scrub horse is always a drug in the market, and is sure to be less and less in demand as time passes and public taste in this respect becomes more fastidious. On the other hand, the good horse was never in greater request than he is today. All over the civilized world the prices paid for the good horse of any distinct class are on the rise, and the man who has him or can breed him is sure of his market and his money. This being the case—and that it is so, is capable of easy demonstration—it behooves us to do our best to find out how to obtain him.

Every man who owns a mare, ought, before stinting her, to draw a mental picture of the horse he wants to get from her, and in doing so must not, of course, lose sight of the mare herself, nor of the influence which she must, of necessity, wield in bringing his projects to fruition. Her size, shape, make and breeding must all be considered and carefully weighed before the sire of the future prodigy is selected, while he must be chosen with the view of perpetuating the good points and overcoming the deficiencies of the dam. The great initial law of breeding is that of "Heredity", or "like produces like"; and while, as will be shortly shown, there are many and frequent deviations therefrom, capable more or less of being guarded against, this is the sheet-anchor of the breeder, the basis of his calculations, and must be acted upon in all cases, except where some individual idiosyncrasy has been incontestably proved to exist. This principle of "like producing like" is so generally recognized that it is scarcely necessary to dwell upon it, except perhaps, to call attention to the little but salient fact, liable in horse breeding to be, by the beginner, overlooked, viz., that like really only produces like from like, or in other words, that in order to obtain a perfect production of the original type, both sire and dam must be of the same type, and also of the same type as to ancestry. In cases where

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this similarity of type does not exist however, and where one parent has a preponderance of line breeding, the prepotency thus acquired will stamp the progeny with his or her characteristics in a marked degree. The transmissibility of disease, or of that tendency towards disease known as hereditary diathesis, frequently appears to evade this last clause of the law, as no amount of sound line breeding or individual soundness on one side seems to avail in preventing the perpetuation of congenital faults through the other parent, even when the latter is of very inferior pedigree. Apart from the question of disease, however, it may be accepted as a general rule that the straighter the pedigree of an animal the greater will be the prepotency exhibited in marking the progeny.

In-breeding, though by no means to be commended, was a great factor in the earlier days of scientific breeding in conferring the power of perpetuating a distinct type upon various families of both horses and cattle, although in such cases I have always been of the opinion that it partakes to some extent of the nature of the next phase of our subject with which we have to deal, viz., "Atavism" or "reversion," better known, perhaps, as "breeding back." "Throwing back," the bug-bear of the cross-breeder, has never been fully explained, although the researches and discoveries of Mendel have, of recent years, thrown a flood of light upon the subject. It is undoubtedly due to dominant ancestral influence but without a thorough and complete knowledge of the lineage direct and collateral of both sire and dam, it is, in most cases, practically impossible to account for its occurrence in line bred stock. Many apparent freaks and sports of nature are due to Atavism and it is the strongest possible argument in favor of pure bred sires and dams, as, in the case of such animals, the reversion, when it does occur, is to an ancestor of the same type and of, perhaps, as good individual quality as the more immediate progenitor, while in breeding from mongrels the chances are all the other way. In short-pedigreed stock also the tendency to throw back is very much stronger, owing to lack of the prepotency conferred by a long line of ancestors of similar type. This is very clearly shown in breeding to the so-called general purpose and agricultural stallions, many of them remarkably fine individuals, but seldom, even when bred to equally fine mares of similar short breeding, getting colts at all equal in any particular to either the sire or the dam, who doubtless obtained their excellence from one or more crosses with pure-bred stock. The stinting of cross-bred mares to cross-bred sires is, for this reason, the most rapid and effectual mode of deteriorating horse-flesh yet discovered, as the large number of shapeless, unsaleable plugs which disgrace this continent amply demonstrates. What intelligent breeder wishing to improve his herd of cattle, would use a grade bull, and yet what better right to public patronage has the grade stallion?

Climate is also responsible for many variations from the law of heredity; although, inasmuch as the change is more gradual and not much noticed in one generation, it does not attract the same attention as the more striking phenomenon of reversion. One finds, nevertheless, in almost every country, that the original or native horse has adapted himself to the conditions, geographical or topographical, peculiar to his surroundings. The Arab, at home in the sandy desert, wiry and spare as the scanty herbage which forms its food; the Icelandic pony, with his rough bone and wool-like fleece; the flint-footed, deer-legged, mountain ponies of Scotland and Wales; the ponderous wide-soled draught horses of the Low Countries; the active mustang of South and Central America, the hardy French-Canadian and the much-enduring Shagginappi are all living proofs of Dame Nature's wonderful power of adapting herself to circumstances.

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Variation from the type anticipated is also occasionally brought about in a way but seldom taken into consideration, viz., through the nervous impression produced on a female at the first service, stamping her subsequent progeny in a greater or less degree with the characteristics of her first mate. This phenomenon, termed scientifically Telegony, is, as most dog-fanciers know, frequently observed in the bitch, being, of course, more noticeable, owing to the remarkable divergence of canine types; but it is also, recent pronouncements to the contrary notwithstanding, patent to the close observer of horses. Frequently, in the Middle States, I have noticed horses which, at a short distance, strongly resembled mules, and, upon inquiry, have invariably found such animals to be the progeny of mares which had first been used in breeding that useful but unpretentious hybrid. Though too generally entirely disregarded, the possible occurrence of this form of variation should be taken into consideration by the careful and ambitious breeder, especially when a pure type is sought to be attained.

Variation may also be due to extrinsic causes, as when monstrosities are borne by females injured or frightened during pregnancy, causing violent nervous shock; or in a less marked form by an impression produced upon the imagination of the dam by some unusual sight not necessarily of a frightful or terrifying nature. Most of us have read of the smart trick which Jacob played upon his father-in-law; and in somewhat more recent years Mr. Warfield, the eminent cattle breeder of Kentucky, relates that an Alderney heifer grazing in the same field with a number of army horses, produced a heifer calf with the letters U.S. distinctly marked in white hairs on the left shoulder, which peculiarity was also noticeable in her heifer calf. While variations of this description are interesting, they are not so frequent among the domestic animals as they are in the human species and may therefore be held to scarcely affect practical breeding operations. The two last mentioned variations are, needless to say, much more likely to occur in animals of a highly sensitive, nervous temperament than in those of a more lymphatic and lethargic nature.

Having now briefly mentioned the laws which govern the science of breeding, it may be well to devote a few words to their application. By the careful selection of good individuals of proven prepotency all the varieties of the horse now known as pure breeds have been brought to the present standard of excellence; and by using the standard thus made ready to his hand, I believe it is possible for the modern horseman to breed any kind of horse he may fancy. While I do not propose to advise farmers as to the particular kind they ought to breed, I may here formulate a few brief rules, the observance of which will, I am certain, take no money out of their pockets:—

1. Use only pure-bred sires; or, at least, such as have sufficient line breeding to insure prepotency. In this way an amount of certainty in experiment, so to speak, is obtained, and the danger of reversion to an inferior type is greatly lessened.

2. Do not club your mares, even at greatly reduced rates, to any one horse; but carefully study the good and bad points of each, with the object of stinting her to the horse best adapted to improve her good points and remedy her defects.

3. Watch carefully the horse markets of the world, and study the questions of supply and demand in horse-flesh, so that you may be able, in the near future, to command the highest price for the produce of your labor and skill.

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4. Avoid violent crossing. All deformed colts are not caused by mental impressions, very many being due to the foolish but too common practice of stinting small light mares to heavy draught sires. It is well known that some stallions are notorious for this sort of thing; and it is a curious but instructive fact that the worst offender I ever knew was himself a small horse, but bred from extra heavy Clydesdale stock on both sides of the house. While this is, perhaps the most objectionable, all violent crossing will be found, as a rule unsatisfactory.

5. Breed only from sound stock. I cannot impress this maxim too strongly upon you. The Royal Agricultural Society of England, acting upon the advice of the Royal College of Veterinary Surgeons, disqualifies for premiums, horses suffering from any of the following diseases; roaring or whistling, ring bone, side bone, navicular disease, curb, bone spavin, bog-spavin, grease, shivering and cataract; and, under certain circumstances, splint, string-halt, contracted feet, weak feet and bursal enlargements, such as thoroughpin and wind galls. You will be wise, then, to look out for these maladies and to refrain from breeding from animals of either sex afflicted with them, as also from parents of faulty conformation or weakly constitution, there being quite enough unsound and shapeless horses now in the country without your deliberately adding to the number.

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THE TREATMENT OF MARES IN FOAL.

As the foaling season approaches, owners of pregnant mares are naturally somewhat concerned for their welfare, and as many Canadian farmers have a comparatively limited experience in horse breeding, a few hints as to the proper diet and general treatment of prospective equine matrons may not come amiss. The mortality among both mares and foals in this country is very much larger than it ought to be, and while in some instances doubtless, loss is unavoidable, in a great majority of cases the death of either dam or progeny is directly traceable to the ignorance, carelessness or cupidity of the owner.

In the first place a great many mares are annually bred which ought not to be put to the horse at all. The farmer who has but one breeding female and who calculates generously to give his mare a week's rest at foaling time, would in most cases find himself in pocket by either keeping her religiously from the stallion, or if unable to resist the temptation, by trading her for a gelding. No mare can be reasonably expected to work hard at all kinds of drudgery from year's end to year's end and at the same time develop, deliver and rear a foal at all likely to prove an ornament to his species or a source of profit to his owner. Mares used in this way are the victims of gross injustice, and such a system of horse breeding can end only in disgust and disappointment. Only such animals should be stinted as can be spared from the rougher and more arduous tasks of the farm both during pregnancy and for some time after foaling. The man who puts a good mare to the horse, rattles her through a stiff harvest, lifts an engine or separator with her several times in the fall, trots her sharply home from the elevator, hauls wood and hay with her all winter over all sorts of roads, her sole respite being in stormy weather when she stands tied up in a none too comfortable stable, on the hardest of hard feed, puts her into spring work and only removes the harness when labor pains make their appearance, is often the first to complain of bad luck because his breeding operations are not a success. The confidence of such men in Providence and in the procreative powers of their long suffering mares is apparently unbounded, for they never seem to profit by experience, failure appearing only to stimulate them to fresh experiments on the same lines. The number of abortions and premature births among mares handled in this unreasoning and unreasonable fashion is enormous, while malformation, malnutrition and malposition of the fœtus are frequently induced in this manner. Of five mares which I noticed, some years ago now, one morning in March, tugging and straining over bare roads with big sleigh loads of wood, two aborted, one dropped a dead foal, one had the foal removed piecemeal, while the fifth after considerable difficulty actually succeeded in rearing a creature in some few general characteristics resembling the species to which he belonged.

In sharp contrast to the above-mentioned manner of handling mares is the pampering system, and while slightly preferable it is very far from being correct or advisable. In this case the pregnant mare is kept entirely idle during the winter; she is in foal, therefore she must not only do no work, but she must not leave the stable, lest she catch cold, lest she slip and fall, lest she run about and over exert herself. She is overfed with stimulating food, the system becomes loaded with fat, the muscular tissues are flaccid, the excretory organs are torpid, the circulation is languid, and when at last the foal sees the light it is puny, weak and undeveloped, more likely to die than to live, while if any trouble or

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obstacle presents itself during the act of parturition the mare herself is apt to fall a victim to the mistaken kindness of an over indulgent owner. Many mares also are treated in this fashion all winter, and with the system weakened throughout by lack of proper exercise and other means mentioned above, are turned into hard exhausting work on the advent of spring, in some cases when they are within a very few weeks of foaling.

There is, however, a medium course, by which a great deal of useful work can be obtained from a brood mare, not only without injury, but with positive benefit to both dam and progeny. Steady—mark the word—not too heavy employment, is even better for a pregnant mare than total idleness, but especially during the last half of pregnancy, it ought to be one thing or the other, either the collar should be taken off and kept off for good or it should be worn more or less every decent day throughout the winter. The far too frequent custom of allowing mares to stand idle on full feed for periods varying from one week to four, and then suddenly starting them off to the distant hay stack or wood lot, perhaps ploughing through snow up to the belly or straining across bare spots with a big load behind them, can not be too strongly condemned. Such treatment is hard enough on any horse, but when meted out to heavy brood mares it is cruelty to animals in the first degree. It is little wonder that so many foals are annually quietly interred in barn-yard manure heaps, and that so many mares prove "not in foal" when the expectant stallion owner puts in an appearance to claim his reward.

Every man who wishes to raise foals successfully ought to have a yard, well sheltered by straw if nothing else, in which his mares when otherwise idle may exercise themselves for several hours a day, thus keeping the muscles developed and the vital organs in full and healthy play, so that when called upon, should necessity arise, to do a little work, no shock may be given to the system. A good, roomy, clean and well ventilated loose box should also be provided for each matron, so that perfect rest may be nightly obtained, and in case of abortion from any cause the isolation thus secured may be the means of preventing similar misfortune to some other member of the stud. When brood mares are worked they should be driven only by reliable and trustworthy men; over exertion, sharp backing or rough handling of any kind should be unknown, the single-trees should be longer than those in ordinary use, deep snow or other bad footing should be sedulously avoided, riding forbidden, and the whip entirely banished from the neighborhood.

The diet should be generous but judicious, if too dry and stimulating it may cause constipation, with torpidity of the liver and other organs, seriously affecting the development of the fœtus, while if too relaxing it will produce a looseness and flaccidity of the whole system, and a general lack of vigor with a tendency to abortion on the slightest provocation. Coarse, bulky, indigestible foods should be avoided, as also any sour, musty, frozen or fermented articles of diet, while all sudden changes are to be condemned. Bran may be given with freedom, but flax seed, oil meal or oil cake, ought to be used with great caution, and only when a decided tendency to constipation is known to exist. A liberal supply of good hay, a little oats and bran twice a day, with soft feed at night, and a regular allowance of salt is fair feeding for any mare, but common sense must be employed and the system regulated by a gradual and judicious adjustment of the component parts of the diet. Ice cold water occasionally induces abortion, and when possible the chill should therefore be taken off. All surgical operations are attended with danger, and medicine should be entirely tabooed, save in case of vital emergency—physic especially, having a tendency

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to relax the womb as well as the bowels, ought to be given only when absolutely necessary. Young mares should be often gently handled all over and accustomed to having the udder and flanks touched, this simple precaution frequently obviating a great deal of subsequent trouble and annoyance. As the time approaches for the mare to foal she ought to be closely watched, so that should assistance—not mischievous interference—be required it may be furnished without loss of time.

With regard to the symptoms of approaching parturition, no rule can be laid down, as many mares will loosen up, make bag, form wax and even run milk weeks before they foal, while others will do none of these things, but simply lie down and institute proceedings without any warning whatever. As a general thing, however, when the teats are full and the piece of wax on the end is succeeded by a drop of milk, when the hips have sunk and the vulva has relaxed, while the animal shows symptoms of more or less uneasiness, the act of foaling is not far off. The treatment to be afforded to the foal and to its dam after the act of parturition has been accomplished may conveniently be considered in another chapter.

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THE CARE OF YOUNG FOALS.

It is well known among breeders that it is very difficult to catch a mare in the act of parturition, and that if the foetus is in proper position, and everything else favorable, birth occurs very quickly and easily. Should you, however, happen to be on hand when your mare foals, and the youngster is coming right, but not progressing as fast as he might, it will do no harm to rupture the membranes and help a little, pulling only when the mare presses, and always in a downward direction or towards the hind feet of the dam. it would appear on first impression that breath is a necessary and indispensable adjunct to life; but in the unborn foal such is, of course, not the case—the first inspiration is taken upon the advent to the open air of the little animal, and it is of importance that nothing shall interfere with the supply of oxygen to the lungs as they begin to assume their vital functions. Many foals are lost through the nasal passages being occluded by the foetal membranes or otherwise, the first feeble attempts at respiration proving of no avail, the blood fails to become oxygenated, the next effort is weaker still, the heart's action, at the best uncertain owing to the sudden change in the course of the circulation, soon ceases entirely, and independent existence ends before fairly begun.

As soon as the foal has emerged, free the head from the envelopes, see that the air passages are clear of mucous or other fluid, and lay the little animal on his right side. If the umbilical cord or navel string is not ruptured at birth, it may be tied with a stout cord a couple of inches from the navel and cut off below the ligature, and to prevent blood poisoning, or the absorption of septic germs, it may be dressed with a strong solution of carbolic acid, care being taken not to injure the surrounding tissues, or it may be temporarily smeared with carbolic oil. Should animation appear to be suspended while the heart still beats, an attempt may be made to resuscitate the little creature by pouring cold water in small quantities on the head, slapping the body with a cold wet cloth, holding ammonia to the nostrils or even by what is generally more convenient, puffing a little tobacco smoke into them. Should these measures fail, a little blood may be taken from the navel, but when syncope is present there is no great hope of bringing about recovery.

I would like here to interpolate a little advice regarding foals "coming wrong". If there is any malposition of the foetus not of a serious nature, you may, if you are at hand, be able to rectify it, using judgment and common sense, bearing in mind that a mare will not stand much rough handling, and, above all, keeping cool and endeavoring to avoid excitement, which at such times is very natural and very dangerous. Should you find yourself unable to remedy the evil, lose no time, but send at once for professional assistance if such can be procured, and, meanwhile, allow no interference save by some intelligent and thoroughly experienced stockman who understands the vital importance of absolute cleanliness and who will know, after making an examination, whether he can do any good or not, and will guide himself accordingly. Great harm may result from well meant but mischievous interference with these cases, and the veterinary surgeon often finds on his arrival a well nigh hopeless subject which, if let alone, he might have handled with one tithe of the trouble and with far greater certainty of saving life.

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Space will not allow of our entering into the details of the various abnormal presentations to which the equine foetus is liable, and of the modes of manipulating them to effect delivery, and such is not the object of this article. We will suppose that the foal is dropped safely and lying breathing and sneezing behind his dam, who has just had the gruel with which she ought always to be rewarded after the termination of her labor. The mare will generally, on rising, turn round and begin fondly to nose and lick her progeny, a process, by the way, of great importance and value to the latter; but young and nervous mares, especially if delivery has been protracted and painful, will often act in an entirely different manner, snorting, pawing and evincing fear and irritation at sight of their offspring. Under such circumstances it is well to protect the foal for a time by a small hurdle or gate placed across one corner of the roomy, airy, dry and warm loose-box, in which ,it is presumed, he has first seen the light, to rub him smartly but gently with soft rough towels and to endeavor to induce the mare to begin the licking process by sprinkling the youngster with a little dry bran or meal and salt. Such measures are not, however, often necessary, kind considerate treatment and judicious letting alone generally proving effectual in bringing about a reconciliation in the family.

Plenty dry, clean bedding should be furnished, the shorter the better, for the foal will soon begin to tumble about in repeated attempts to get his long and shaky legs under him. If he does not succeed after a reasonable time in getting on his pins, a little assistance may be given, and his dam proving friendly, he will soon, if let alone, find his way to the maternal font; but if he is unable to stand, or the mare is touchy and restive, she ought to be held while he is guided to the teat and allowed to obtain nourishment. If the foal is weak and quite incapable of supporting himself, the mare may be milked and the fluid thus obtained given to him slowly and very carefully, it being a matter of great importance that the little chap obtain if possible some of the very first milk secreted by the mare. When once friendly and confidential relations have been established between mare and foal, they should be left alone for some time, care however being taken to remove the placental membranes from the stall as soon as they are dropped.

If the mare has gone much over her time and especially if she has lost much milk, it will be necessary to watch the foal closely for symptoms of constipation, which will be manifested in the first place by continued elevation of the tail accompanied by straining without the passage of faeces. This will be succeeded by dulness and then by evidence of pain, the abdomen will become bloated, the little animal will show great uneasiness and begin to perspire and the pulse and respiration will be accelerated. In the early stages a few ounces of soapy warm water or a little raw linseed oil introduced by a syringe into the rectum will generally afford relief, but should acute pain and distress make their appearance, the administration of two or three ounces of castor or linseed oil with twenty or thirty drops of laudanum and half a teaspoonful of turpentine well shaken up, will be in order; a small enema should also be given from time to time, and the abdomen covered with a woolen cloth wrung out of hot water. These measures if adopted in time will usually be sufficient and it must not be forgotten that the administration of medicine to newly born foals is fraught with great danger so that the mechanical remedies, viz: the injections and the stupes to the abdomen are much preferable to large or repeated doses of physic.

Diarrhoea may set in, either spontaneously from septic causes or as a result of the too free use of medicinal agents, the mortality among young foals from this affection being very great. The treatment will depend on the origin of the

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trouble—if from medicine little can be done save in keeping the strength supported by stimulants and concentrated nourishment, and for this purpose an egg beaten up with a tablespoonful of brandy and a few ounces of milk from the mare will be found very effective—this mixture may be repeated from time to time as the condition of the patient may demand. Should the diarrhoea on the other hand, appear to originate spontaneously, it is possibly due to irritation of the bowels, and in such cases no treatment is more successful than the exhibition of one or two table-spoonsful of castor oil with a little laudanum to allay any tendency towards griping. No relief being afforded by these measures it is advisable to try an antacid, and for this purpose a table-spoonful of lime water may be given in two or three ounces of milk from the mare every three or four hours, while the strength of the patient is to be sustained by stimulants and nourishment as recommended above.

Where veterinary assistance is not available, five to fifteen grains of grey powder given twice a day will often be found beneficial.

In severe and protracted cases of septic origin formalin has been successfully used. This agent must however be used with caution, the best mode of administration being as follows: Dissolve one fluid ounce of commercial formalin in 10 ounces of water and give of this solution a teaspoonful or a teaspoonful and a half, according to the size of the colt, in one pint of milk, twice or at most three times a day.

Small injections of flour gruel or very thin starch containing a little laudanum are also useful.

The greatest attention should be paid to the sanitary conditions; the stable as well as the patient and the dam should be kept scrupulously clean while the diet of the latter should be closely watched and changed gradually from time to time. The facts that animals on pasture are seldom affected and that the malady once established in a stable, appears to recur regularly, are strong arguments in favour of the adoption of all possible hygienic precautions.

Another and perhaps the most fatal disease to which young foals are liable is suppurative inflammation of the navel and joints often erroneously termed inflammatory rheumatism. The first symptom of this malady is a difficulty of motion, accompanied by swelling in the region of the navel or in one or more of the joints, the swellings rapidly increasing in size and terminating in large abscesses containing enormous quantities of unhealthy pus. The progress of the disease is characterised by high fever, rapid emaciation and great weakness followed by stupor, foetid diarrhoea, general marasmus and death. Curative treatment does not appear to be of much avail: the opening of the navel if inflamed should be frequently dressed with carbolic lotion, or other suitable antiseptic, a mild anodyne liniment applied to the swellings, the bowels gently moved by a small dose of oil and the strength sustained by concentrated nourishment and the judicious use of stimulants, while the abscesses when ripe are to be freely opened and the cavities injected with an antiseptic solution, The disease is septic and an ounce of prevention is worth a pound of cure. It is almost invariably due to the absorption of germs (streptococci) by the exposed end of the umbilical cord or navel thus affording good reason for the treatment of that part recommended above. With a view to the prevention of this disease also, the most scrupulous cleanliness should be observed in the housing of young foals and their dams; the all too common customs of letting them lie on a couple of feet of heating manure thinly covered with straw, or on a cold wet earthen floor, cannot be too strongly

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condemned. The floor and bedding shou.ld always be dry and clean while an occasional sprinkling of lime will not cost much and will add greatly to the healthfulness of the inmates.

Where the existence of infection is suspected the floors and stalls should be thoroughly scrubbed with boiling water and subsequently treated with a reliable disinfectant such as crude carbolic, creolin, or a solution of corrosive sublimate of a strength of one part to 1000 parts of water.

Occasionally the urine continues to dribble from the navel opening owing to the duct from the bladder having failed to close after birth. In such cases the parts should be thoroughly cleansed and rendered aseptic after which a subcutaneous ligature is to be applied but this like all other operations requiring surgical skill, and in fact all really serious or acute conditions should, when possible, be relegated to the qualified veterinarian.

There are of course numerous other ailments and accidents to which young foals are liable but those mentioned are responsible for the needless loss of many valuable animals and should therefore be carefully guarded against and promptly but cautiously dealt with on the first indication of trouble.

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THE CARE OF WEANLINGS.

To some, advice on this head, is of course, superfluous, but others, less experienced, may be glad of a few hints as to the most approved methods of starting the youngster on an independent career. In the first place, be certain that your foal is old enough to wean, that he is in fair condition, thriving and healthy, that he knows what grain is and what it is for, and that, should you have any cow's milk to spare, he will not be above drinking it. As to age, no colt should, if at all possible, be permanently separated from his dam until he is at least four months old, while another month, or even two, by her side will make him a better horse and lessen considerably the risks of his first winter. Many farmers, however, who are trying to raise colts can ill afford to let their mares suckle so long, and while it might, in many cases, be more profitable for such men to refrain from breeding altogether, the fact remains that they must use the mares on the farm, and the foals have to suffer accordingly.

It is a good plan to teach the foal to eat out of the same box as his dam, and it is astonishing how little tuition, even with very young colts, is necessary when the food is placed within easy reach. For some time also before the foal is actually weaned he should be schooled to drink milk, if there is milk to be had, and it is well to remember in this connection that milk drinking is an accomplishment of no little value for any horse to acquire, nothing being more advantageous to an animal suffering from any febrile or debilitating disease, than the voluntary absorption of milk in lieu of other fluid when the appetite for solids is capricious or altogether lost. As regards the diet best suited for young foals, many different opinions are promulgated, but in the experience of the writer nothing is equal to good sound oats with a moderate admixture of bran twice a day, and a well scalded, not too bulky, mash of the same materials, seasoned with a tablespoonful of salt, and perhaps a handful of crushed oil cake for the evening meal. Many recommend crushed oats, but repeated trials have convinced the most successful breeders that whole oats are more nutritious, and if properly masticated, as they generally are when fed with dry bran, more easily digested than chopped feed of any kind.

Colts should be halter broken and taught to lead when yet with the dam, as this renders them much more tractable and easily controlled during the excitement inseparable from weaning, and also facilitates housing when the accommodation is limited, and there are several to be kept together. Loose boxes are preferable to ordinary stalls for young stock, but provided the stable is clean, airy and well lighted it will do no harm to have them tied at night, taking it for granted that they enjoy for the greater part of every day the freedom of a roomy, and in winter, well sheltered yard. This latter point is of very great importance. Your youngster must have a chance to develop bone and muscle, and in no other way than by lots of exercise can he be reasonably expected to properly assimilate the generous diet recommended above, while despite all old-fashioned ideas to the contrary, without a liberal grain allowance he will not likely be much to look at when the sun begins to melt the snow in the spring. When two or more colts are kept together it is better to have them separated at feeding times, or the strongest of the lot will be apt to wax fat at the expense of his weaker or less voracious companions, many backward colts being literally starved by careless neglect of this simple precautionary measure.

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Weanlings are frequently troubled to a considerable extent with intestinal worms of various kinds, especially if grazed on low lying pastures in late summer or early fall. Some of these parasites are more to be dreaded than others, but none of them are desirable guests or in any way beneficial to their involuntary hosts, and it is therefore advisable to take measures for their removal. The old farmer's remedy of wood ashes and salt is not to be laughed at in this connection, and if persevered with in small doses for some time will often have the desired effect, but where a more speedy and certain riddance is desired it is well to give a course of anthelmintic powders, as iron sulphate 1 drachm or powdered arecanut 2 or 3 drachms twice a day in a little soft food for a week, to be followed by a drench composed of turpentine 1 oz., and raw linseed oil from 10 oz. to a pint, according to the size and condition of the patient. This mixture should be given on an empty stomach and all dry food withheld until the bowels have responded to its action. In all cases of intestinal worms, benefit is found from occasional injections of tepid water strongly impregnated with soap, and for this purpose Gamgee's enema funnel, a cheap and convenient instrument easily turned out by any tinsmith, will be found suitable. Some varieties of worms demand for their successful removal a repetition of the medicinal treatment but those most commonly met are generally satisfactorily disposed of at the first attempt.

External parasites should also be guarded against. Many a good colt has gone to skin and bone from the constant irritation and uneasiness produced by lice, and whenever a young animal shows unaccountable loss of condition and want of thrift it is advisable to examine him closely for signs of the presence of these undesirable companions. Should they be detected, the sufferer may in reasonably mild weather be washed well with carbolic soap and soft warm water, and after thoroughly drying the skin, carefully and closely dressed, more particularly about the roots of the mane, with a good insecticide. For this purpose an ointment composed of equal parts by weight of sulphur and lard will be found effectual, as also safe, cheap and easily procured. In cold weather the washing must of course be dispensed with, but the ointment may be applied without risk in a moderately warm stable at any season of the year.

When colts are debarred from taking much outdoor exercise their hoofs very soon become deformed, and great harm is often done to the bony and tendonous structures of the limbs from neglect to properly trim and regulate the growth of the horny coverings of the feet. Accidents of various kinds are liable to occur, and in all such cases the advantage of having the patients halter broken, thoroughly domesticated and free from fear of their human friends is incalculable. This state of affairs can only be brought about by the most careful, systematic and painstaking handling of the young animals from the time they are foaled, but more especially during the first week or two after weaning.

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DOMINION OF CANADA

DEPARTMENT OF AGRICULTURE

BRANCH OF THE LIVE STOCK COMMISSIONER.

OBSERVATIONS

UPON

GOVERNMENT ASSISTANCE TO AGRICULTURE

IN CERTAIN

COUNTRIES OF EUROPE

BY

H. S. ARKELL, B.S.A.

Assistant Live Stock Commissioner.

BULLETIN No. 15

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OTTAWA, June 28, 1911.

The Honourable,
The Minister of Agriculture,
Ottawa, Ont.

SIR,—I have the honour to present herewith a paper by Mr. H. S. Arkell, B.S.A., Assistant Live Stock Commissioner, entitled 'Observations upon Government Assistance to Agriculture in Certain Countries of Europe.'

This paper contains much useful and valuable information regarding the methods followed by various European Departments of Agriculture in effecting the dissemination of useful knowledge and otherwise assisting in the development of the agricultural resources of their respective countries. I am satisfied that it will be read with interest and profit by many Canadian farmers and would, therefore, recommend that it be published for distribution as Bulletin No. 15 of the Live Stock Branch.

I have the honour to be, sir,
Your obedient servant,
J. G. RUTHERFORD,
Veterinary Director General and Live Stock Commissioner.

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OBSERVATIONS UPON GOVERNMENT ASSISTANCE TO AGRICULTURE IN CERTAIN COUNTRIES OF EUROPE.

The observations upon the particular assistance rendered to agriculture and agricultural industries by the governments of certain countries in Europe, as contained in this report, are based upon notes made by the author while on a visit to Great Britain, France and Belgium during the summer of 1909. It had been the original intention, in planning this visit, to confine the account to an inquiry into the nature of the work undertaken in connection with horse breeding, but the organization of the Department of Agriculture in Ireland seemed to offer such valuable suggestions, that a brief outline is included of the operation of measures in use by it for the encouragement and development of general agriculture in that country. As originally presented these notes were issued in the form of a report to the then Minister of Agriculture of the province of Quebec, with whose assistance they were obtained and prepared. They have now been partially rewritten and revised in so far as seemed necessary, in order to extend their suggestion and application to the wider field of the agriculture of Canada.

Ireland's need, agriculturally, had been seriously recognized for many years, and it will be remembered that a Royal Commission took evidence, in 1907, upon the nature of congestion in the rural districts. The memoranda, compiled by this commission, established very pointedly that lack of information and lack of organization had been two features of very great importance in retarding progress and in continuing conditions which had maintained poverty upon the land. Previous to 1899, the efforts of the Royal Dublin Society had been directed strongly toward the improvement of conditions amongst the farming population, but, in part, the somewhat local nature of its organization prevented its work from having the wide significance that was necessary and in the end found desirable. It paved the way, however, for a more comprehensive policy and in 1899 an Act was passed creating a Department of Agriculture and Technical Instruction for Ireland, whose business it has been to administer a rather large amount of money and machinery in the interests of Irish agriculture.

For convenience sake, the work undertaken by this body may be considered under three heads:—

1. Agricultural instruction.
2. Improvement of live stock.
3. Special investigations.

Professor Campbell states in his evidence before the Royal Commission that, after the organization of the Department, the first duty of the staff was to attend meetings of county councils for the purpose of explaining to them the provisions of the Act and to receive and consider suggestions as to what the Department should do for agricultural development. During these visits advantage was taken of studying the peculiarities of Irish agriculture with a view to meeting the particular need of the various counties in a more intelligent way. The conclusions arrived at were to the effect:—

1. That the most important work which the Department had to perform was that of laying the foundation of a system of agricultural education.

2. That the application of the Department's energies might be effectively directed, in the interests of the farming community, toward the improvement of live stock.

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3. That further projects of a more specific nature in the way of special investigations might wisely be undertaken because of their value for demonstration and experimentation.

It is proposed to give a brief outline of what methods have been pursued in these three directions and, as far as possible, an appreciation of the value of the work to the country.

AGRICULTURAL EDUCATION.

The general scheme evolved was framed in such a manner that it might adapt itself to the peculiar conditions of the country. The scheme provides in the first place for a system, in each county, of 'itinerant instruction' in agriculture, horticulture, dairying and poultry keeping, such that a fund of information and a source of advice may be readily accessible to farmers and their sons who, in many cases, have few other means of acquiring it. This method of instruction was followed in subsequent years by winter schools of agriculture, held at various centres in the counties, where a little more systematic training was made possible, but which could still be obtained at small expense.

Upon the work of this itinerant instruction is based the permanent institution of the agricultural schools and colleges. At three stations in the country young men are taken in as apprentices for one year and receive practical and technical training in agriculture at a moderate fee. More stations would have been established had teachers been available, but there has been a lack of these from the start.

This station work, in turn, leads up to that of the central institution for the country, the Albert Agricultural College at Glasnevin which is in affiliation with the Royal College of Science in Dublin. At this college is provided the highest form of technical education for the training of men who are to become teachers and specialists in agriculture.

A conception of the nature and policy of the work undertaken in connection with education can be gathered from the above summary of the methods employed, as well as an idea of the purpose that suggested the framework of the whole institution. The details of the attendance in the various branches will indicate what has been accomplished. In 1907-8, there were enrolled in the agricultural course at the Royal College of Science, 26 students; at the Albert Agricultural College, 73 students; in the three schools at Athenry, Ballyhaise and Clonakilty, 66 students, and at the winter classes in the counties, of which there were 33, 529 students. Most of the courses in these winter classes were from fifteen to twenty weeks in duration.

As a supplement to the regularly organized system of education, as outlined above 1,453 lectures were given by itinerant instructors, of whom there were 34, at which 81,276 persons were present. Much other work of like nature in connection with dairying, poultry raising, plot demonstration, spraying, bee keeping and butter making, was also undertaken, but of which the details may be omitted. The greater part of this general work is placed in charge of the itinerant and private instructors and their efforts are effecting noticeable improvement in the methods employed by the farmers. The co-operation of the county councils in relation to this itinerant instruction is obtained by placing a large share of its direction under their control. The final responsibility, however, works back naturally to the central authority, and a comprehensive system is thus constituted by which the organized effort may be rendered most acceptable and efficient according to the needs and opportunities of the various districts

The following statements may serve to reveal the gradual but satisfactory growth in popularity of the general scheme. In 1902-3, there were but two winter classes organized with an enrolment of 44 pupils. In 1903-4, the pupils numbered 161: in 1904-5, 317; in 1905-6, 422: in 1906-7, 449; and in 1908-9, 529. Such an expansion

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is particularly suggestive as indicating the degree in which these classes have grown in popular favour. Another instance of the same general fact may be given. In 1900-1, there were but three itinerant instructors at work, one in each of three counties, while in 1907-8, there were 34, and these were distributed through practically all the counties of Ireland.

For an estimate of the actual monetary value of this work, the following table giving the export value of eggs and butter will be suggestive.

	1904.	1907.
Butter exported	£3,793,391	£4,008,220
Eggs exported	£2,257,362	£2,920,539

It is estimated that the annual increase in the value of eggs exported pays of itself the cost, to the country, of the Department of Agriculture. Much encouragement has been given through the facts noted, to those who have been engaged in agricultural education in Ireland, and particularly to those upon whose shoulders has fallen the major share of its direction and control.

IMPROVEMENT OF LIVE STOCK.

Apparently the most popular of all the undertakings of the Department has been that which has had to do with the improvement of live stock. The energies of the Royal Dublin Society had been in earlier years more particularly engaged in this direction. The Irish farmer's income is derived mainly from live stock and, after the passage of the Act, the interests of those engaged in the industry were early placed before the Department for its consideration. Whatever has been attempted has been undertaken in co-operation with the local county committees upon whom in fact has fallen much of the management and supervision of the details of the various schemes. It may be stated here that the Act empowered the county councils to impose a rate equal to one penny in the pound, on the taxable value of rural districts, comprised within the county, for the purposes of agriculture and such other rural industries upon which they were authorized to expend money. In the majority of instances in the case of counties that were able to afford it, the initiative and assistance of the Department depended upon the action of the counties in assessing themselves for the purposes of the schemes in question. The fact that every county in Ireland now voluntarily so assesses itself to make good its share of the expenditure connected with the undertaking, is perhaps the best guarantee of the need and utility of the whole enterprise.

In connection with the live stock improvement scheme there are three lines of work involved, that with horses, that with cattle, and that with swine. For convenience sake, the horse-breeding scheme may be treated of at this point in conjunction with the other two, though at the risk of breaking the account when the methods employed in horse-breeding in other countries are dealt with.

HORSE-BREEDING

It may be here noted that Irish saddle horses have been for many years accorded rather a fine reputation on the English markets and that they have chiefly gained favour as hunters and for chargers and remounts in the British army. The lines of effort followed by the Department have been mainly to conserve this type and to promote the breeding of this class of horse more generally throughout the country. It was found that the introduction of draft blood into Ireland was playing havoc with the breeding of saddle horses and the use of draft sires is now confined to certain counties only and even to limited areas in these counties. The first business of the Department was to invite applications from owners of high class stallions to have

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their animals inspected for suitability and soundness, which inspection became the basis for enrolment into its register and for a subsequent subsidy. The standard of recognition and entry into the register was placed on a high level at the beginning and more than one-third of the horses presented were rejected as being unsuitable for use as sires. Much disappointment was caused by this seemingly stringent regulation, but it is now realized that it has been of direct advantage to the country, since it has led to the importation of a large number of good sound sires and as Professor Campbell says: 'a larger number of worthless animals which would otherwise have been imported have been excluded.'

The Department advertises in September of each year that it is prepared to open a register. The applications are received in October and November for such stallions as have already stood at stud in Ireland. Applications for other stallions must be forwarded in September. After the applications have been received, an officer is sent to the country to inspect the stallions entered. His examination is in respect to appearance and soundness. In addition to this inspection, there are other regulations required to entitle the stallion to entry in the register and no stallion not in the register can receive a subsidy. Stallions which are approved are accepted for particular districts only and may not without the written consent of the Department be removed to other districts. In 1908, there were 296 stallions on the register, while in 1901, there were but 128. The increase has been due largely to the desire of farmers not only to have their horses receive the official recognition of the Department, but that as well, through this recognition, they may obtain assurance of increased patronage from the farmers and breeders. It may be added that in the event of there not being a sufficient number of registered stallions in any county for breeding purposes, the Department has, through a well-controlled system of loans, enabled individuals and societies to purchase approved stallions on easy terms.

In making such a loan, it is a matter of first importance that the interest of the community be well served. There is also a proviso attached that the total amount of the loan shall be paid in regular annual instalments in five year's time, during which time or until the loan be paid the stallion remains in substance the property of the Department.

Another feature of the horse-breeding scheme which parallels the registration of stallions is the selection or nomination of mares, a feature which helps to induce farmers to retain their best mares for breeding purposes. In the spring, exhibitions of mares are held in the counties where a limited number of the largest and best are selected, to the owners of which nomination tickets are issued entitling each to select any registered stallion to mate with his mare. This ticket is given to the stallion owner at time of service in lieu of fee, and he in turn, upon presentation of the ticket, collects his money from the Department. The ticket has a value of from £2 to £3, and if the service fee exceeds that amount the difference must be paid by the owner of the mare. In 1907-8, there were in all 11,036 mares presented at these exhibitions, of which number 5,442 received nominations.

In the popular estimate the subsidy to the mares has been the most effective part of the scheme, but the Director of the work holds very strongly to the opinion that the registration of the stallions has been of greatest value to the country. The utility of the undertaking appears to lie in the stimulus and impetus it gives to systematic breeding, particularly as regards selection and judicious mating and again in the greater degree of uniformity which it promotes and renders possible in the animals that are bred and reared throughout the country. It may be thought to involve too large an expenditure to be continued for any great length of time. It would appear, however, that its service is largely initiatory and educational and that shortly the burden of its continuance may be thrust back upon the communities as they acquire the ability to carry it on themselves.

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The cattle-breeding scheme has been an especially valuable one to the Irish farmers and one in which they have taken great interest. There is a very large trade between Ireland and England in store cattle, which are bred and reared in Ireland and fattened in England and Scotland. A keen demand has always existed for well-bred, early maturing animals and the better class of bulls introduced by the Department into the country has had a decided influence in levelling up the capacity of the cattle to take on flesh. Such was the opinion expressed to the writer by the well known editor of the *Scottish Farmer* in the course of an enthusiastic comment upon agricultural organization in Ireland. From what could be learned, no scheme has received greater endorsation at the hands of the farmers and none has brought greater financial advantage to the country.

Briefly it consists in this. The Agricultural Committees of the County Councils offer subsidies of £15 each to the owners of high-class bulls, provided that they allow the use of their bulls to farmers at the nominal fee of one shilling per cow. Government inspectors make a selection of bulls in the country as a basis for awarding the premiums and, in addition, personally attend fairs and sales with a view to the purchase of suitable animals for resale on easy terms to individuals or to county organizations. In 1908-9, there were 999 bulls receiving premiums in this way.

Dairy cattle-breeding is also receiving attention in connection with this work though the methods employed are somewhat different from the above. The main virtue of the scheme lies, no doubt, in the generous introduction of new and better blood into the country and, were it not for the poverty of the farmers, the same results could be obtained with a much smaller expenditure of money. It will be remembered, however, that half what is required is met by a tax which the counties lay upon themselves and it seems to be the opinion that no other money expenditure has been more directly successful in carrying increased revenue to the farm.

The assistance given to swine breeding is organized in much the same manner as in the cattle-breeding scheme and the details of it need not be described. The production of pork is a great industry in Ireland, and the attempt is being made to develop the country into a larger and more influential competitor for trade in the markets of Great Britain.

In connection with the work of live stock improvement one fact has made itself very evident in Ireland, viz., the scarcity of suitable breeding sires in all classes. Not only has this scarcity been made apparent, but difficulty has been experienced in supplying the need through importation or otherwise. It has been noted that the stimulus and encouragement which has been incidentally given to the breeding of pure bred stock has been one of the most hopeful signs during the development of the work. The scarcity which Ireland feels and has felt will be realized and appreciated by any country as it undertakes progressive work in the same direction and is, it will be admitted, a very certain guarantee of the need of something being attempted. It has been further demonstrated that, with improvment in the lower grades, greater progress is made possible amongst the breeders of the better classes of stock and there is thus a compensating activity in either direction that works toward the mutual advantage of all concerned.

SPECIAL INVESTIGATIONS.

The special investigations undertaken in the various branches of agriculture follow along the channels through which government assistance is very frequently given in this country. They touch in concrete fashion the primary element of production and the people have reaped a direct advantage as the results, through demonstration and illustration, have been placed within their reach. It is worth mention-

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ing that, as the farmers have learned to recognize the value of this direct method of work, they have given the greater support and adherence to the movement in favour of agricultural education.

FIELD EXPERIMENTS.

Irish farmers were badly in need of assistance and advice in connection with the management of the soil and in the growing of crops. Ignorance of the principles of cultivation, drainage, manuring and seed selection had resulted in wasteful practices and in the incapacity of the farmers to obtain a reasonable and normal return from the land. Consequently much attention has been given to the study of manures and manuring. The results of the experiments in this connection have been embodied in leaflets and distributed over the country and have been drawn upon to furnish the substance of many lectures that have been given by the itinerant instructors.

The Department has viewed with satisfaction the better judgment exercised in the application of manures since its work began and in their increasing use. It believes further that this work alone fully compensates it for what has been spent as a whole on county agricultural instruction. The experiments have covered the principal crops of the farm, viz., oats, potatoes, mangels, turnips and hay.

In connection also with the field experiments, variety tests have been conducted with grains and potatoes. Barley and wheat have received chief attention in these tests because of the value of the one for malting and of the other for milling purposes. Very definite results were obtained in the tests with barley, one variety surpassing all others in suitability for use in Ireland. The potato-growing industry is being extended through the experiments of the Department and the supply of marketable produce is being developed.

Much assistance has been given to the business of flax growing through technical instruction and through experiments with manures and seed. The interests of the tobacco-grower have been considered and the forestry problem has been undertaken in a systematic way, in the attention given to both public and private interests.

In the peat industry, in seed testing and potato spraying the government's activity has also been exercised and with advantage to the country. In the case of the peat industry, the Department rented an Irish bog, erected peat fuel machinery and demonstrated the process of most successful manufacture. The actual object lesson amongst the people themselves has been found almost the most effective method of stimulating interest and improvement in the work in which the Department has engaged.

In the matter of fruit and vegetable growing, a horticultural expert has been at work in making a survey and in estimating the capabilities of the country in this regard, particularly in the non-fruit growing districts. His investigations have extended to giving instruction in the growing, harvesting and marketing of fruit. A profitable outlet for the produce has been made possible, through the extension and in some cases revival of commercial jam-making, fruit-preserving and cider-making.

The poultry industry has been developed through somewhat the same system as has been utilized in connection with the other branches of live stock. Eggs and high class breeding stock have been distributed at moderate prices from central farms. instruction has been offered, the fattening process has been effectively demonstrated and assistance has been given in marketing produce.

Two other industries have received attention, cheese-making and butter-making. The first is not of large importance since it cannot be successfully worked conjointly with the raising of store cattle, but encouragement has been given to it where its development was deemed most advisable. Butter-making, however, has long been an important industry of the country, though the methods employed were not of the best, and the product lacked in uniformity and much of it in quality. The Department has turned its attention to the encouragement and development of the creamery system, through the inspection and supervision of creameries, through special courses

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of instruction for creamery managers and through butter-making competitions. Home dairying has also had its share of attention. The utility of the whole scheme has been spoken of elsewhere.

The important phases have now been covered of the work of the Department in Ireland. From the somewhat general resumé an idea may be obtained of the nature and sphere of its operation, but it is impossible to give an adequate impression of the spirit and motive which underlie it all. The farming population of Ireland has been poor and in some districts the people have suffered from their poverty, particularly as compared with the comforts of civilization which are now believed to be almost indispensable. The barrier of indifference and want of knowledge had made progress an almost impossible and unknown thing. The expenditure of human energy had been wasteful in a high degree and the resources of the country and its people had remained undeveloped and in a large sense unproductive. Ireland's future was menaced through her failure to move forward and in her inability to meet the competition of neighbours and rivals in markets where she had been accustomed to find an outlet for her produce. No one thing has had such an immense and controlling influence on the outlook and possibility of development which it has effected as has the formation and organization of the Department of Agriculture and Technical Instruction. The work undertaken in the interests of agriculture has been especially considered in this inquiry but the Department has engaged itself also in the teaching of domestic science which has opened up possibilities in the home to parallel those upon the land, and in providing facilities for technical instruction which is meeting the claims of technical industries and of those engaged in them, with the same intent and in like degree. The undertaking has been a public spirited enterprise with a large field of labour, and it has borne fruit not only in improving the commercial prospects in the agricultural industries but in stimulating and encouraging the people in educational and social improvement.

The farmers and their families are learning how to do things and the finger of organized intelligence and energy is leaving its impression, upon every phase of operative endeavour in the country. Methods are being improved, production cheapened, markets strengthened and, though such work must necessarily move slowly, substantial progress is being made. Exports are increasing and improving in quality, particularly those of potatoes, butter, poultry and eggs, cattle, pork and horticultural products. The general acceptance of and participation in the scheme by every county of Ireland substantiates its popularity and utility. The largest argument in its favour lies in the fact that steps have been taken to make the work permanent. It began with demonstration to catch the eye and stimulate endeavour and is developing, through education, to the teaching of principles and the training of the faculties of observation and judgment. Ireland may very well be destined to become an important competitor against countries of established reputations in the great produce markets of Great Britain. If so, she will be another example of what has been and is being successfully accomplished in like manner in Siberia, Denmark, Holland and in lesser degree in other European countries.

HORSE-BREEDING IN FRANCE.

Since much space has been taken in a description of the general field of work in Ireland, the resumé of the methods adopted by other countries in the assistance given to horse-breeding must necessarily be short. Those in France are particularly interesting from the fact that organized effort in this direction has been in progress since the 17th century. In that century, the Government established a stable of stallions at Le Pin, which it has since maintained and from the time of Napoleon it has had almost complete control of the breeding of horses for cavalry purposes. At the outset it may be noted that the policy of the Department has been dominated in a very large

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sense by the definite purpose of producing and breeding suitable horses for the army. Most of the horses concerned in this policy are owned outright by the Government. The total number of Government-owned stallions in 1907 consisted of 559 Thoroughbred, 2,218 French coach (*) and 574 draught, in all 3,351. It will be seen that the great majority of these horses are Thoroughbreds and French coach, and are in fact sires of most suitable blood and breeding for the production of army horses. The best animals in the country are selected for this purpose and many high-class English Thoroughbreds are imported, together with a few Hackneys.

These stallions were, in 1907, distributed over 947 breeding stations and served 150,934 mares. The service fee in all cases is low, varying from 20 to 100 francs or from $4 to $20 in our money. The farmers, therefore, have the opportunity of having their mares served by carefully selected and high-class stallions at moderate rates. The applications for the service of these are determined by lot. Premiums are occasionally given to Thoroughbred mares that they may be reserved especially for breeding purposes. The system of selecting and subsidizing mares was at one time resorted to, but, after a trial, has been largely abandoned. Through the donation of prizes at exhibitions, at race meetings and in various other ways, encouragement is further given to the breeding of horses for this purpose.

In this connection it may be stated that a Government school has been established at Le Pin for the training of men who have to do with the selection, inspection and purchase of horses for the Government. By this means a worderful uniformity has been obtained in the types approved and bred. The training and equipment of special officers as afforded by the Government school has promoted greater efficiency in the public service and has secured a gratifying degree of permanency for the policy of the Department. The whole system has been admirably adapted to the purpose for which it was intended and has given horse-breeding an impetus and a direction of which the country may well be proud. Under ordinary circumstances, however, and under conditions such as we have in Canada, the method of work involves too large an expenditure of money. A part of the system, nevertheless, not yet described, is worthy of consideration and contains features which, in a modified form, might well be adopted elsewhere.

Reference is to the methods more particularly in vogue in connection with the breeding of draught horses. France has five practically distinct draught breeds, each confined to a particular district of the country. Of these, the Percheron, bred in the district of Perche, is perhaps the most important. From what could be learned the large majority of the mares in this district are registered. They are owned by small farmers who keep usually two or three each and who almost invariably raise at least one or two colts during the year. At weaning time, these colts are practically all sold to the large stallion owners, who grow them until they are a year and a half old. They then either sell them or put them to work until they are of serviceable age. The young horses as they develop are carefully fed and trained and, at four years, a stallion is well grown in body, kind in harness and well mannered. That he has earned his own living for the last two years has detracted nothing from his value and, it may be, has given to the bone, nerve and muscles of his system a strength and endurance that will prove an asset to him for the rest of his life.

The Government concerns itself chiefly, in connection with the assistance which it renders to the horse-breeding industry, with the stallions retained for breeding purposes. In France, all horses that stand for service must pass an examination as to soundness before Government inspectors and must be officially accepted, after which they receive the mark of a star upon their neck. The rejected ones are branded with an R and may not be used for breeding purposes. Stallions deemed especially worthy are termed 'approved' and receive subsidies ranging from 300 to 600 francs. These, in 1907, numbered 1,603, and served 82,736 mares. Other stallions accepted, but not

* Also called 'Anglo-Normans or half-bred.'

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deemed of more than ordinary merit are termed 'authorized' and receive no subsidy. In 1907, there were of these 185 and they served 9,746 mares. In all cases a horse is required to serve fifty mares to obtain a premium. After the season a service record of mares is forwarded to the Department and, after foaling, a record of the foals is given. For Draught horses, the service fee varies from 15 to 25 francs. Because of the subsidy, therefore, farmers are able to obtain the use of the best horses at very moderate rates. The encouragement given, through the premium system, to the possession of high-class sires has materially affected the quality and individuality of the horses bred in the district and the principle of the system has been one rather widely adopted in various European countries. The Scotch premium system is well known and Scotch breeders have a large faith in the advantage they have derived from it. In speaking with Mr. Wm. Montgomery at Kirkcudbright, he said: 'We know this system and it has given us the results we want.'

HORSE-BREEDING IN BELGIUM.

In Belgium, the nature of the Government assistance is of much the same character as that rendered through the premium system in France. Government inspection of stallions is obligatory and none may stand for public service except such as are accepted. The card of acceptance is of value for one year only and the official examination is an annual affair. In each district exhibitions or meets are held annually and first, second and sometimes a number of third prizes are awarded for two-year old, three-year old and aged horses, shown in their respective classes. The prizes vary from $15 for a third to $40, $80 and $110 for first prizes in the various sections. Special prizes of $140 and $180 are given at provincial exhibitions where a number of districts compete with their representatives. Another feature is the awarding of what are known as 'primes de conservation' which may be termed 'retaining premiums.' These are granted, in addition to the above mentioned prizes, for the purpose of retaining the horses for breeding purposes. Under ordinary conditions they vary from $100 to $160. When, in the annual inspection, a horse of exceptional value is found, the above mentioned premium may be replaced by one having a value of $1,000 to $1,200, this amount being payable each year for five years. In this instance, however, the conditions are very rigid and unless they are lived up to the premiums revert to the State. Horses receiving retaining premiums are usually required to serve specially selected mares. It was learned that at one time special prizes had been granted to mares but that such were not now awarded.

In conversation with Mr. Prosper Mathieu, a large horse owner and breeder of Brussels, he expressed himself as well satisfied with the working of the system in Belgium. He preferred the premium system to that of Government ownership of stallions. The uniformity of the horses throughout the country, particularly as regards conformation, type and colour, could not but be noted and the animals bore the stamp of utility in a marked degree. There is a large market for draught horses in the seaport towns such as Antwerp, but the biggest trade is with Germany. This country takes large importations every year and judging by figures which were received the Belgian horses are the most valuable of any purchased from foreign countries. It is partly in recognition of this trade that the Government has taken its interest in horse-breeding and the income which the farmers derive from the industry is an important part of their livelihood.

SUGGESTIVE WORK OF OTHER COUNTRIES.

It would be interesting to follow out the methods employed by other European countries in the way of government assistance to agricultural industries, but mention may be made of those of only one or two. During the last fifteen years the Gov-

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ernment of Holland has taken an active interest in all matters pertaining to the manufacture of butter and cheese. Acts have been passed to regulate the industry and extend co-operation through instruction given on the farms in reference to the feeding and breeding of cattle and to the production of wholesome milk.

State schools and experiment stations have been opened and have become centres of information to those engaged in the work whether in the factory or on the farm. A system of State supervision has been inaugurated, through the agency of inspectors and control stations, with a view to improving the quality of the output, making it more uniform, and of giving to the makers the advantage of a Government guarantee in the disposal of their produce. The extent of the market and of the export trade warrants the Government in the support it gives and it would appear that, at the present time, Ireland and Holland are paralleling each other in the work they are doing in this connection.

Of Denmark, the advance this country has made in the production of bacon is well known, and of the advantage that it has reaped through its trade on foreign markets. The efficiency of the Government assistance in reorganizing and recreating the bacon and dairy industries is a splendid illustration of what is really possible and of how effective such assistance may be. At the meeting of the British Association for the Advancement of Science, held in Winnipeg in 1909, the Danish Live Stock Commissioner described methods in use in Denmark which had resulted in raising the average yield of Danish cows from 80 lbs. butter in 1864, to 220 lbs. in 1908. This result has been obtained through the formation of local cattle breeders' associations, through which bulls are purchased for use amongst the members; through a subsidy given for such bulls; through the formation of control unions which engage men to conduct tests for the farmers in connection with the milk yield of their cows, the percentage of butter fat and the cost of feed; and again through the giving of prizes at fairs to cows and bulls in recognition, above all else, of their merit as breeders and producers. It is a recognized fact that, compared with Canada, in the production of milk and bacon the Danes are at a disadvantage through rate of rent for land and through cost of feed. Denmark, too, is a very small country and yet she has been able to obtain the best of the argument in competition for trade with Great Britain. The enterprise of the Government in co-operation with the farmers has made this possible and an income of millions of pounds annually has consequently resulted to the country.

CONCLUSIONS.

It is obviously difficult even if we appropriate the experience of other countries to suggest or recommend a policy that will be suitable for our own. Canada, through her provincial and federal Departments of Agriculture, has now, for a number of years, been formulating and developing policies, through the undertaking of which steady and definite progress has been made. It may well seem almost a truism, however, to say that the development of this country, agriculturally, will necessitate the consideration and adoption of measures of wider scope and purpose than have been either advisable or possible in the past. The extent of the territory and the variety of the interests involved, even including only those having to do directly with live stock, creates a situation which makes a comparison with the conditions obtaining in the other countries we have been studying almost out of the question. The primary principles, nevertheless, remain about the same.

The one fact that is emphasized perhaps more forcefully than any other by the experience of foreign countries, and for that matter by our own, is that without intensive effort in a definite direction and with particular application in individual communities, any general system of education or even of demonstration is likely to prove largely inoperative. Without the enthusiastic co-operation of the people

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themselves, it is impossible to get results commensurate with the money expended. In observing the methods of work in Europe, nothing was impressed upon the author more forcibly than the fact that government activity had to be carried directly to the country districts and the wheels of its enterprise set in motion there before it could expect to accomplish results. Contact with the people by actual demonstration is necessary before their support and co-operation can be obtained. It is not without faith, therefore, in the aim and direction of the substance of the schemes herein set forth that they are commended for consideration and, with necessary modifications, for adoption and application to the interests of the live stock industry in Canada.

The policy, to give point to what has already been suggested, in principle and in practice, must be eminently simple. It should consist in carrying the information obtained by scientific research and practical investigation direct to the farmer, not through the avenue of lectures and addresses only, but by practical demonstration and preferably by such demonstration as the farmers themselves shall set in operation. System in research is being more and more fully perfected every year, but system in practice of the results of such research has scarcely been more than conceived.

The individual community must constitute the unit in such a system of practice. There can be no better way of effecting improvement in horse-breeding, in cattle, sheep, pig and poultry breeding than, in the beginning at least, by stimulating and directing it in individual centres. The pork packers in Ireland pursue such a policy in their purchase and distribution of Yorkshire boars. In the Eastern states, the proprietors of condensing establishments have adopted a similar system in arranging for a supply of selected dairy bulls for their patrons. That a government is in a position to offer very great assistance in directing the practice of individual communities and of promoting co-operation amongst the members of each is unquestionable. A movement in this direction will constitute an active and powerful agency operating to counteract the evident tendency toward the merging of capital in the ownership of land, thus assisting to secure to the small holder the possession of his farm. Further, it will promote production and so develop the resources of the country as to give Canada a much larger place in the trade of the world.

United States authorities estimate that for every dollar expended in extension work there is a return of $20 to the farms. A government now need fear no embarrassment in engaging itself in the operation of such measures as have been here proposed. The utility of such work has in recent years been somewhat widely demonstrated and in concerning itself in this aggressive fashion with the important industries of the rural districts, it may be assured of the backing and support not only of the farming population but, as well, of the approval and good-will of all the great business enterprises of the country.

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...SITY
OF
CALIFORNIA

DOMINION OF CANADA

Department of Agriculture

Branch of the Live Stock Commissioner.

THE CARE OF MARKET EGGS

By W. A. BROWN, B.S.A.

BULLETIN NO. 16.

Published by Direction of the

HON. MARTIN BURRELL, Minister of Agriculture,

OTTAWA, ONT.

May 1st, 1912

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Ottawa, May 1st, 1912

The Honourable Martin Burrell,

Minister of Agriculture,

Ottawa, Ont.

Sir,—

I have the honour to present a paper by Mr. W. A. Brown, B. S. A., of this Branch, entitled "The Care of Market Eggs."

This pamphlet directs particular attention to the nature of losses resulting from inadequate and unsatisfactory methods in the handling of market eggs, and suggests means by which permanent and needed improvement may be brought about in the Canadian egg trade, to the corresponding advantage of both producer and consumer.

The marketing of poultry products is a comprehensive subject and it has been thought advisable to restrict this treatise to a discussion of but one feature of the industry. It is believed that the information which it contains will be of timely interest to farmers and poultry men generally. I would recommend, therefore, that it be published for distribution as Bulletin No. 16 of the Live Stock Branch.

I have the honour to be,

Sir,

Your obedient servant,

H. S. ARKELL,

Acting Live Stock Commissioner.

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Acknowledgment.

The author desires to acknowledge the valuable assistance of Drs. Higgins and Evans, of the Pathological Division of the Health of Animals Branch in the preparation of certain technical photographs for use in this bulletin.

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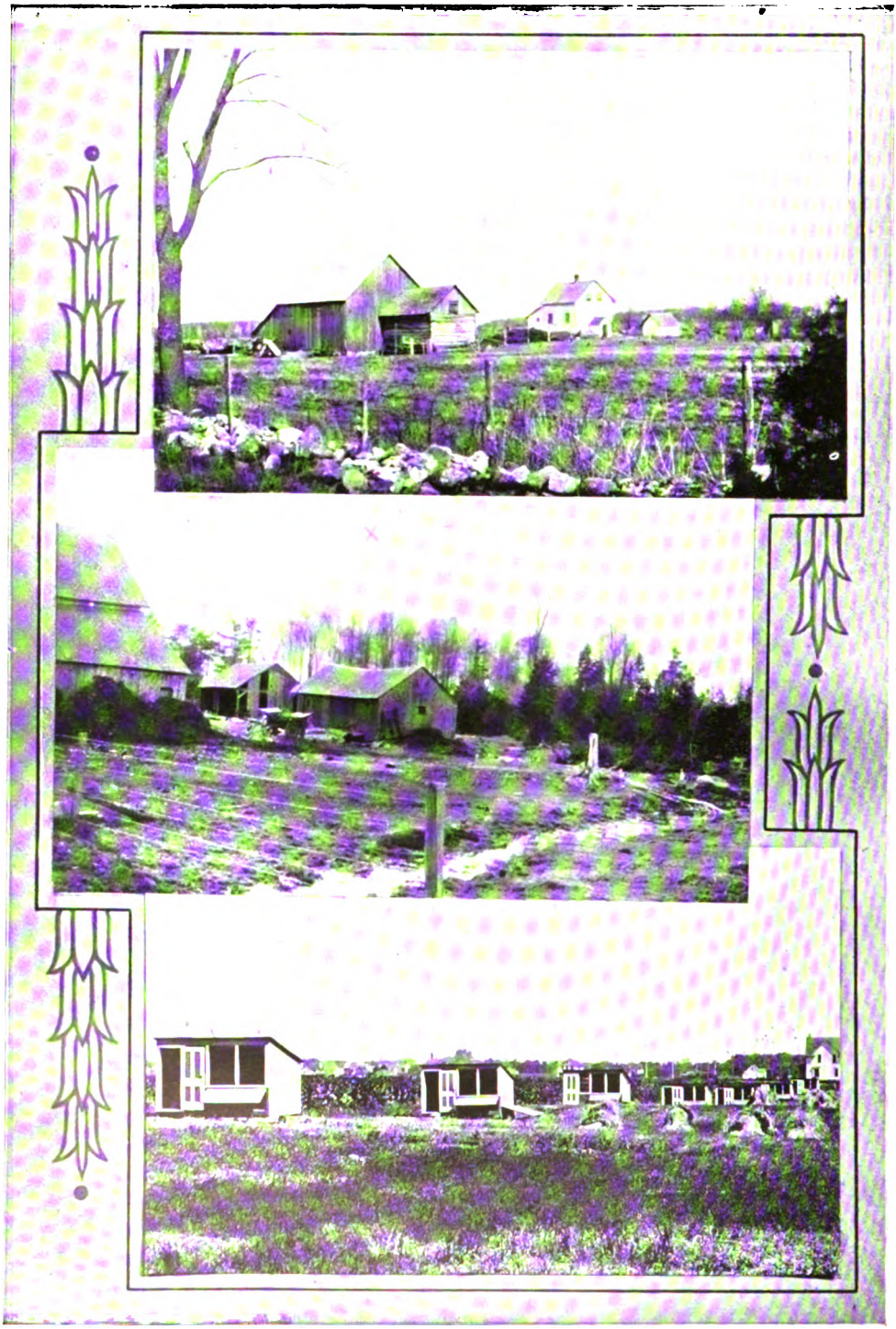

A Contrast in Methods of Keeping Poultry on the Farm

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The Care of Market Eggs.

Introduction.

Eggs are a perishable food product. They do not improve with age and no amount of handling or manipulation will enhance their quality. The poor quality of the average market egg has been attributed by many persons to its retention in cold storage. This is an erroneous idea, for while the quality will not improve, yet if the eggs are full and fresh and sweet when placed in a well equipped and properly managed cold storage, there is not, during the time they are ordinarily held, sufficient change in quality to render them unfit for food.

Marked improvement has been made in the methods of handling other kinds of food stuffs. The same old, antiquated methods of handling eggs that prevailed many years ago, prevail to-day. This bulletin is a preliminary attempt to analyse the situation and point out ways and means of improvement.

Extent of Loss Resulting from Careless Methods.

So great is the shrinkage and loss in the egg trade and so inferior the quality of the average egg on the market, that the consumption of eggs would, no doubt, be seriously curtailed were it not for the fact that eggs are a staple in the general routine of household economy. They are prized as a high-class breakfast dish by practically everyone and are valued as a tonic, stimulant and almost perfect food for invalids, convalescents and children.

Gross neglect, carelessness, dishonesty and a general lack of appreciation of the perishable nature of an egg are causing to the Canadian egg trade a loss of several million dollars annually.

The Usual Method of Handling Eggs.

Eggs under average conditions take a very circuitous course in reaching the consumer. Someone on the farm gathers the eggs whenever convenient, sometimes once a day, sometimes two or three times a week. They are carried to the house and held until such time as is convenient to take them to market. Then if the number available seems small, a hasty search, by the children, will usually reveal some hidden nests, the contents of which are added to those in the basket without question as to their condition or state of incubation.

These eggs are for the most part traded for merchandise at the country store and there, as a rule, their quality does not improve since they are often held for varying lengths of time and stored in questionable places. The egg buyer receives them next and, if working for the big packing firms, he hurries them on with all possible speed. If working for himself, he is apt to hold them, particularly on a rising market. From observation one might infer that the common carriers, the railways and the express companies are, at times, rather too prone to forget that the egg is perishable and the shell fragile, if one is to judge by their frequent lack of care in handling and in leaving them exposed to extreme heat on station platforms and in hot express cars.

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Fig. 1—A Cooper System Cold Storage Plant. Capacity 10,000 (30 dozen) Cases of Eggs

Fig. 2—A Refrigerator Car, used in Interprovincial Shipments, and by some Dealers in making Collections.

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Of course, there are careless dealers and commission men who allow the eggs to deteriorate in their hands. but as a whole the eggs receive better treatment in this section of trade than in any other. The dealers know that they cannot improve the quality of the individual egg, and the large majority of them honestly endeavour to prevent further deterioration in the shipments as received. By candling they remove the bad, the shrunken, the broken, the dirty eggs, etc., from among the good eggs, and place them in the grades where they belong. Many firms have established regular purchase days and their buyers make regular rounds and shipments. Some firms even retain, for their own use, a number of refrigerator cars, which are despatched regularly to receiving points. Eggs thus received are candled and some may be placed in storage. The dealer sells the eggs to the jobber or may sell direct to the retailer. As a rule, the jobber does not hold them long, and in fact may never see them.

The average retailer or city grocer can and should improve his methods considerably. It is business to advertise his goods, but he seems to forget that, while eggs will not melt and run away like butter or readily sour like milk or cream, they are nevertheless perishable. Many a grocer has lost good customers through unduly exposing his eggs behind a plate glass window in a heated store or by leaving them for a period of days close to a stove, a register or some other source of heat. The customer, in turn who is justly irritated at finding only eight or ten good eggs in a dozen, has no more justification than has the farmer's wife for placing the eggs on the top shelf in the kitchen cupboard, when the proper place for them is in a refrigerator or in a cellar where they will not come in contact with any mustiness, foul odors or other sources of contamination.

The Present System of Trading at the Country Store, Conducive to a Continuation of Careless Methods.

A great many bad eggs find their way into the market through the old-time practice of exchanging eggs for merchandise at the country store. Many a merchant would gladly give up the egg trade if he could. It places him in a very awkward position. He knows that to buy eggs is to sell goods. Therefore, it is not good business to refuse eggs and if he bids low his customer will go to his competitor across the street. He does not have the means to detect the bad eggs and some farmers knowing this take undue advantage of him. In fact the merchant has not time to candle eggs and buy on a loss-off basis, in the rush of the summer season. Many farmers put off their marketing until Saturday afternoon or evening and in the course of five or six hours the merchant may take in several thousand dozen. In the State of Kansas, where it has been made a criminal offence to offer, for sale, eggs unfit for food and the dealers have agreed to buy on a loss-off basis only, the country merchants have had a very good excuse for relinquishing their share in the trade. The eggs now go direct to the dealers and the result is a marked improvement in quality.

The Results of Lack of Care.

In order to secure some adequate evidence on the lack of care, the resultant losses, causes of loss and the distribution of same throughout the year, a series of

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questions were sent out to over two hundred egg dealers in Canada. The first question was :—

"With reference to your own experience, do you consider the suggested figure of seventeen per cent for total shringkage, too high."

The answer from those engaged in handling eggs, direct from the farm or the country store, has been invariably "No" and some have indicated that the figure is not high enough. In fact the sum total of the estimates given in the subsequent pages slightly exceeds seventeen per cent.

I.—The Loss Through the Sale of Heated Eggs or Eggs in which the Germ has Commenced to Grow.

As a result of the heating of fertile eggs, from four to six per cent of all eggs marketed are unfit for human food. A temperature of 70% F. or higher will start the germ of a fertile egg to grow. The greatest lost is apparent between the months of June and September although such eggs are often held until later.

In nature the purpose of an egg is to hatch a chick, but when man intends an egg for food he should aim to defeat that purpose. He must distinguish between an egg for hatching and an egg for market and eliminate the fertile eggs from the marketable product by excluding the male bird from the pen at all times except during the breeding season.

II.—The Loss Through the Sale of Shrunken, Held and Stale Eggs.

Sixty-five per cent of the contents of an egg is water ; the shell is porous and evaporation takes place whenever the egg is surrounded by a temperature above freezing. The higher the temperature and the more rapid the air circulation, the greater will be the evaporation.

An egg will grow stale in the nest, if the house is hot and ill-ventilated or if broody and other hens sit on it. The water content will evaporate just as readily in the consumer's cupboard as in the farmer's kitchen and the country merchant has no more right to keep his eggs near the stove than the city grocer has to place his behind the plate glass window.

Eggs in cold storage are held at a temperature of about 30° and the fact that the average merchant or buyer has not similar facilities is ample reason why the eggs should not be held. Notwithstanding this, however, the practice of holding eggs for higher prices is so common that a shrinkage of not less than five per cent. results. This is most apparent in the fall months, but has to be taken seriously into account from June until January inclusive.

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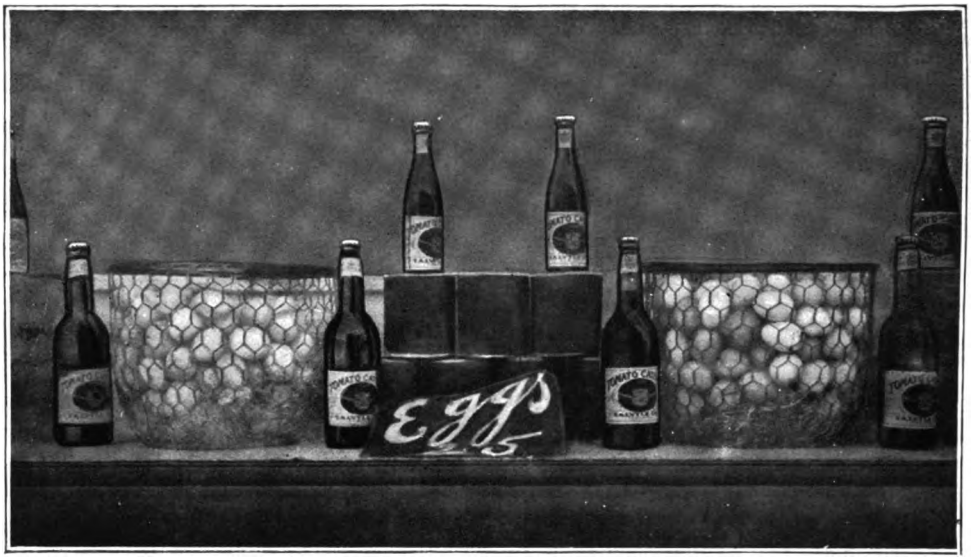

Fig. 3—Eggs placed in Store Windows Deteriorate rapidly.

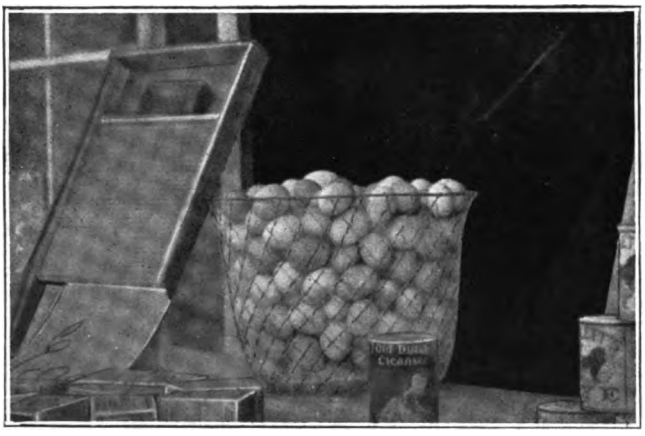

Fig. 4—A Basket that was used alternately for Eggs and Lemons

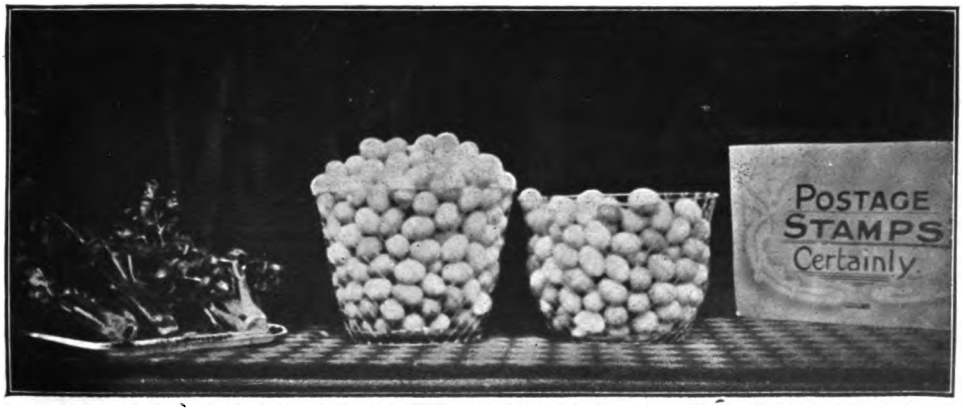

Fig. 5—Sun Struck

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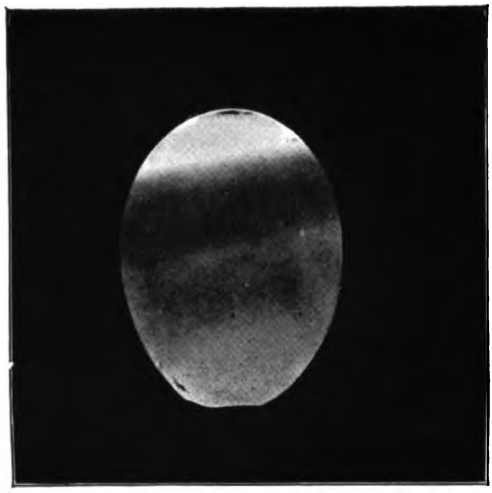

Fig. 6—A Heated Egg known to the Trade as a Heavy Float

III.—The Loss from the Sale of Rotten Eggs.

Rotten eggs like rotten apples find their way into the trade. They are not so readily detected, however, and for this reason are even a more serious menace. Common rots are the result of decomposition. The germ dies in a fertile egg. And under certain conditions rapid decomposition takes place and hydrogen sulphide gas is liberated. Eliminate

Fig. 7—Egg showing from 8 to 12 days Incubation

the fertile egg and this repulsive form of loss will disappear.

Other forms of rotten eggs occur. The albumen of an egg constitutes an excellent culture medium for the growth of bacteria. An egg is moist when laid, and in the foul, unsanitary condition of many nests readily becomes infected. The porous shell offers little or no resistance. The tough inner membrance is, however, practically bacteria proof unless brought in contact with excessive dampness

Fig. 8—Egg about Due to Hatch

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or even exposed to moist conditions for some length of time. It is for this and other reasons that interested dealers send out the instructions, "Under no conditions wash eggs." If a washed egg is placed in the consumer's hands without delay little trouble may result ; but if the bacteria once enters into the albumen of an egg and that egg is held and exposed to conditions of moisture and warmth favourable to bacterial development, the different forms of spot rot readily appear. Some continue to grow even in the low temperature of a cold storage house. About three per cent. of all eggs are discarded on account of rot in some form and the loss is apparent throughout the year, with the exception, possibly, of the months of March and April.

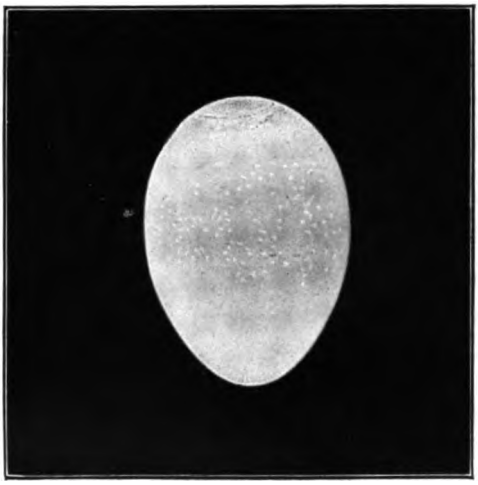

Fig. 9—Fresh Egg from 4 to 5 days old, see air cell.

Fig. 10—New-Laid Egg, air cell scarcely perceptible, note extremely fragile shell.

Fig. 11—Held Egg, the dark part indicates the Yolk.

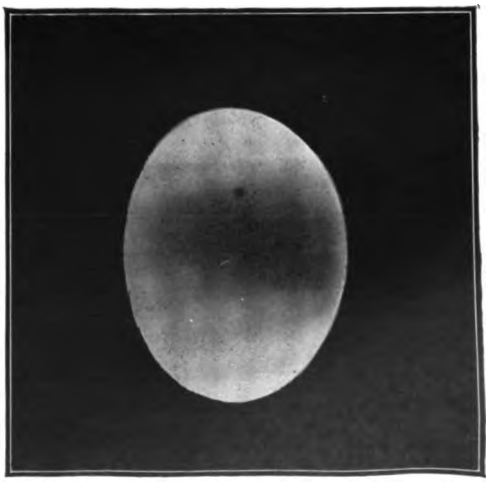

Fig. 12—Held Egg, shows greater evaporation than egg in Fig. 11.

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Fig. 13—A very Stale Egg, showing Broken Yolk and large Air Cell

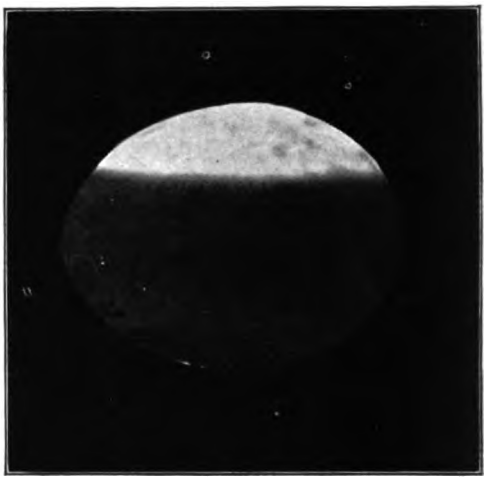

Fig. 14—A Rotten Egg.

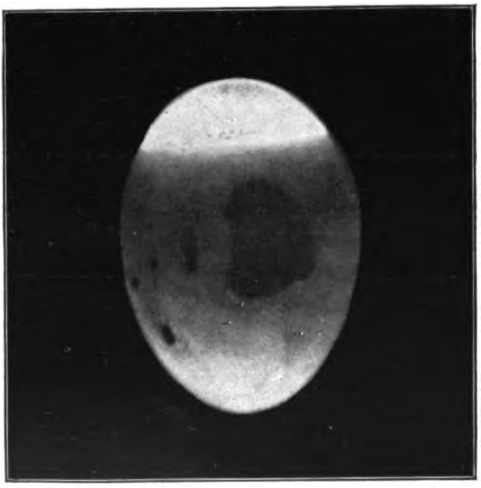

Fig. 15—Spot Rot.

IV.—The Loss Due to Breakage

Broken eggs are found in all sections of the trade. Accidents will occur, but carelessness and thoughtlessness account for a great deal of the breakage.

Broken eggs are known to the trade as leakers, dents or checks (blind checks). Leakers are not only a loss in themselves but they produce smeared eggs. Dents are eggs in which the shell is broken, but in which there is no rupture of the inner membrane apparent. Blind checks are the faint cracks not readily apparent to the eye. They are only detected by the use of the candle or by clicking two eggs together.

Many eggs are broken in transit either through the jolting of loose or poorly packed eggs over the rough country roads or through careless handling by the cartage and express companies. Broken eggs, no matter how slight the break, should not be placed in any egg case intended for shipment. They not only constitute a loss themselves, but they soil the fillers and make them unfit for future use. At least three per cent. of all eggs marketed show breakage in some form and broken eggs are apparent at all seasons of the year, particularly in the spring.

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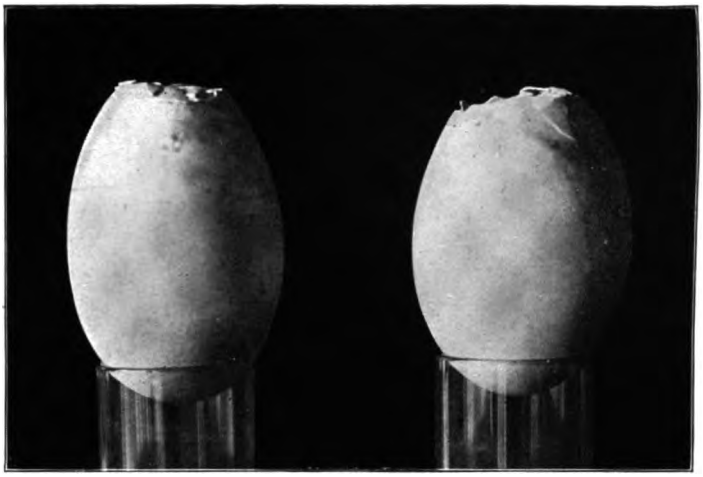

Fig. 16—Broken Ends—the Result of Shipping extremely Long Eggs in the average case.

Fig. 17—A Faint Crack—Known to the Trade as a Hair Split.

Fig. 18—A Dent, as distinguished from a Leaker.

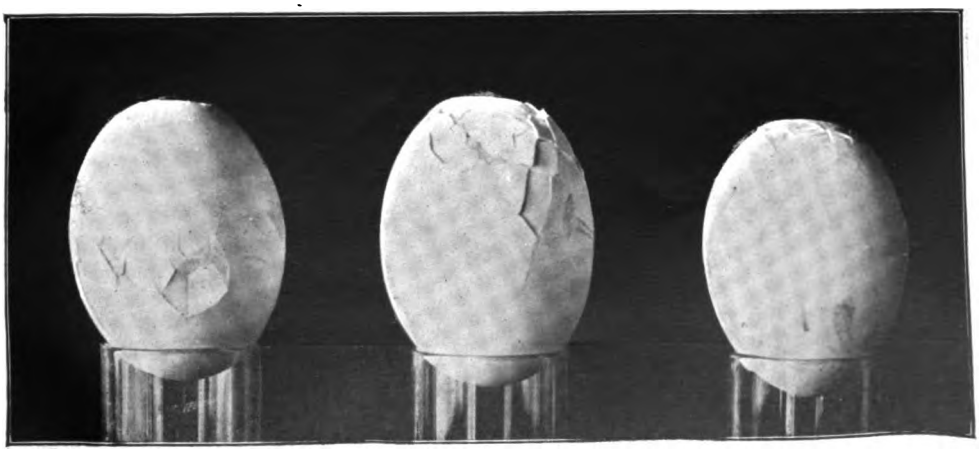

Fig. 19—Cracked Eggs.

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V.—Loss and Shrinkage Through the Sale of Dirty Eggs.

Dirty eggs are of three kinds :—

1.—Plain dirties, those to which soil and manure adhere.

2.—Stained eggs, i.e. dirty eggs that have been washed.

3.—Smeared eggs, those that become covered with the contents of broken eggs.

The producer is largely to blame for the first two classes of dirty eggs. A

Fig. 20—Dirty and Smeared Eggs

dirty egg is a disgrace to the person who sells it. The hens should not be blamed for the appearance of dirty eggs. They almost invariably lay clean eggs and they prefer to lay them in clean, cool places.

Dirty eggs should never be marketed. They are repulsive to the trade and they seriously detract from the appearance of good eggs and cause the entire shipment to sell at a lower price. This may not be apparent at the country store

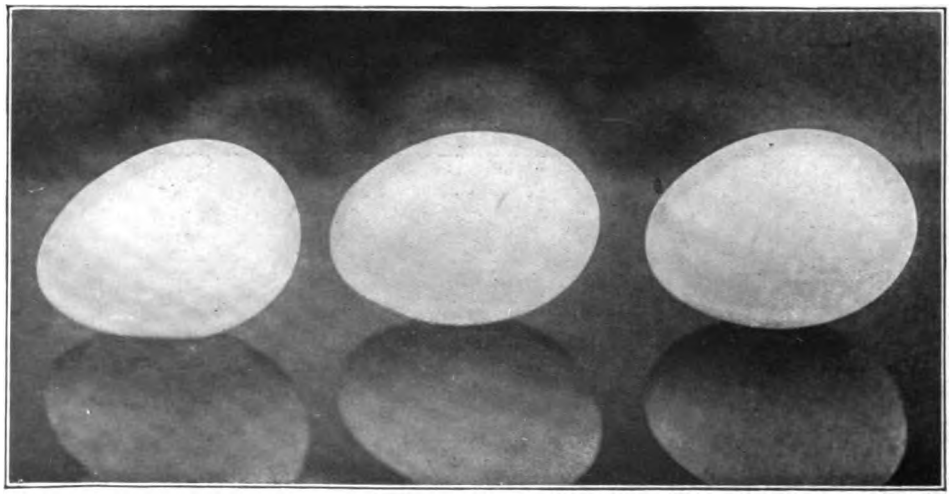

Fig. 21—Clean Eggs

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where severe competition forces the merchant to take all or lose a customer, but the dealer is obliged at considerable expense, to remove most of them and must therefore discount the price he pays accordingly.

It is not wise to wash market eggs. Washing removes the natural bloom and gloss and makes the eggs appear old and stale. Clean nests should be provided, thereby reducing the number of dirty eggs to the minimum. About three per cent of all eggs marketed show contamination in this form and it is particularly apparent in the wet seasons, spring and fall.

VI.—Loss Due to the Sale of Mouldy and Bad Flavoured Eggs.

So readily do eggs absorb odors that in the early days of artificial refrigeration many packers incurred heavy financial loss through having stored their eggs

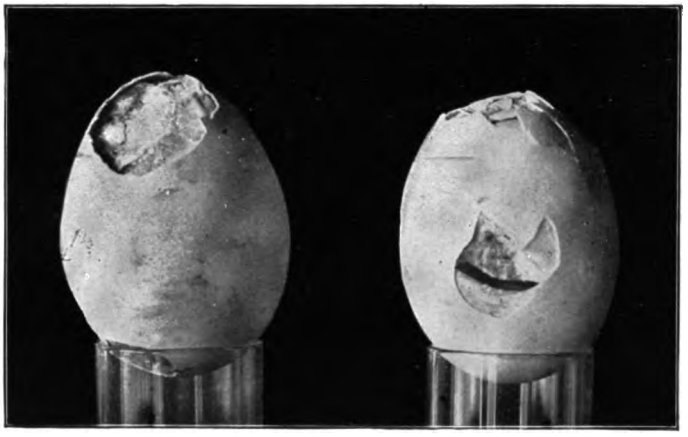

Fig. 22—Cracked Eggs commencing to Mould.

in chambers containing citrous fruits, fish, etc. In all modern cold storage houses large separate rooms are provided in which eggs alone are stored.

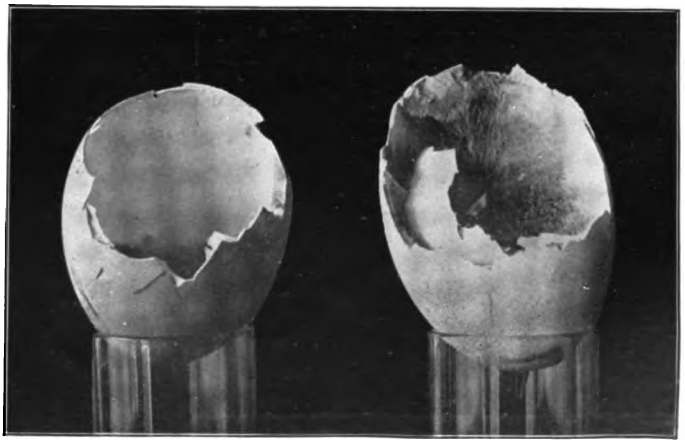

Fig. 23—A Shell found in an Egg Case.

Fig. 24—A Broken Egg showing a Heavy Growth of Mould.

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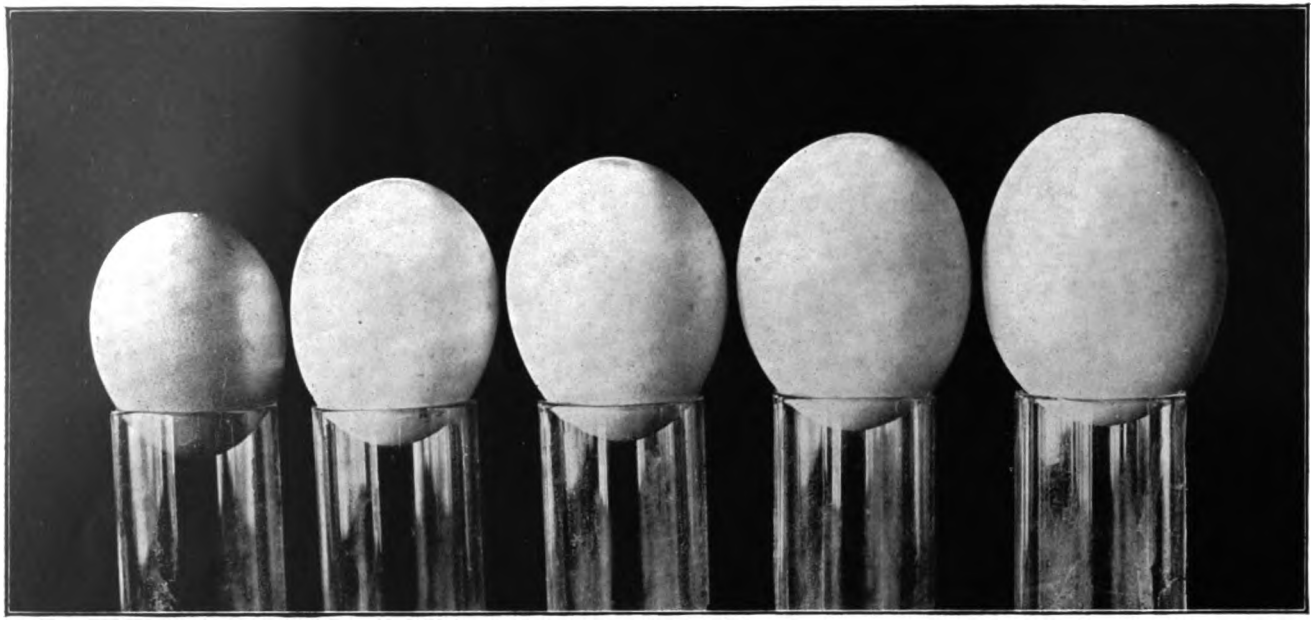

Fig. 25—A Contrast. These five eggs were selected from 2 layers (6 dozen) of eggs in the same case.

No. 1 Weighs at the Rate of 15½-16 oz. to the Dozen.

No. 2 Weighs at the Rate of 18-19 oz. to the Dozen.

No. 3 Weighs at the Rate of 21-21½ oz. to the Dozen.

No. 4 Weighs at the Rate of 22½-23 oz. to the Dozen.

No. 5 Weighs at the Rate of 24½-25½ oz. to the Dozen.

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Musty eggs are very common, due no doubt to their having been collected in pails or baskets containing damp, musty straw or litter or to their having been placed in egg cases containing old, soiled fillers. Eggs are often held in damp, musty cellars where decaying vegetables, kerosene, etc., are also stored. The different forms of mould appear in eggs just as in cheese and, while desirable in the one, are repulsive in the other. Care should be taken to eliminate all possible source of contamination in this way. It is difficult to estimate the amount of loss caused by the above stated factors because they influence the flavour rather more than the appearance and as such their effect is not apparent until the eggs are consumed. Dealers estimate that at least one per cent of all eggs are affected in this way, but the experience of the housewife indicates that this figure should be much higher.

VII.—Loss from Frosted Eggs.

While it is unfortunate that only a small proportion of all farm hens lay in the winter, it is even more so that such a large percentage of these eggs are allowed to become frosted. Frozen eggs are not only undesirable in themselves, but when they thaw they often, through leakage cause smeared eggs. Frozen eggs and dirty eggs should be kept at home.

VIII.—Loss from the Sale of Small Eggs.

Some small eggs will no doubt always be produced, but there is no excuse for the large percentage found on the market at the present time. Pullets, commencing to lay, produce small eggs at first and old hens at the moulting time are prone to do likewise. The great majority of small eggs, however, come from the mongrel, nondescript, stunted stock found on such a large proportion of our farms. Some of the small sized, light weight, pure bred stock is undesirable for the same reason. Eggs ought to weigh a pound and a half to the dozen or forty-five pounds, net, to the thirty dozen case. No figures are available at the present time to indicate the percentage of small eggs that are marketed, but anyone who has had experience in the egg trade must readily appreciate the extent of this difficulty.

Suggestions for General Improvement in Methods Followed on the Farm.

It is evident from the foregoing discussion that, while all parties engaged in the egg trade are more or less to blame for the present lack of quality, yet the conclusions reached from our inquiry indicate that the great difficulty centres about the methods employed in handling eggs on the farm. Present conditions surrounding the production and marketing of farm eggs show distinct evidences of lack of care and appreciation of the fundamental considerations underlying the trade and, while it is the intention later, to point out some specific instances in

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which all can make improvement, the following suggestions deal directly with general conditions on the farm :—

1.—Keep only pure bred stock of the larger general purpose varieties.
2.—Discard all stunted, nondescript and all diseased stock.
3.—Give the poultry-house a thorough cleaning every spring and keep it clean ; spray often, and whitewash walls, roosts, etc., regularly.
4.—Feed the flock on pure and wholesome food and provide pure water in clean utensils.
5.—Hatch the chickens early ; keep them separate from the old stock and give them every possible opportunity to grow into strong, healthy, vigorous, well matured birds before the cold weather comes, in the fall and early winter.
6.—Give the poultry the care and attention they deserve and, if the farmer has not the time or inclination to do the work himself, let him delegate it to some responsible member of his family.

Specific Suggestions in Regard to the Proper Care of Market Eggs.

To the Farmer.

Remove the male birds from the flock immediately after the breeding season and market no fertile eggs.

Provide roomy nests and plenty of clean nesting material, preferably dry shavings or cut hay.

Keep the nests clean and sanitary.

Collect the eggs regularly at least once, better twice, a day in moderate weather and more frequently in very warm and very cold weather.

Remove at once in clean utensils to a cool, dry cellar.

Cover with clean cloth to prevent dust from settling upon them and also to prevent evaporation and fading.

Do not pack loose in a box when taking them to market, but rather secure a suitable egg case and thus avoid breakage.

Market as frequently and as directly as possible.

To the Merchant.

Buy on a loss-off basis, if possible, and encourage other merchants to do the same.

Insist that the farmers furnish first quality eggs only.

Keep in mind the perishable nature of the product and do not hold eggs on a rising market without proper facilities for storing them.

Realize that fresh eggs at any season of the year are much more valuable than stale eggs, when prices are higher.

When shipping, pack carefully in strong, clean cases and fillers.

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To the Egg-Buyer.

If buying direct from the farmer, make regular and frequent collections.

Pay a premium for quality and do not hesitate to condemn bad, dirty, small and broken eggs.

Encourage the farmer to keep better poultry and more of it.

If buying from the country merchant, encourage frequent shipments and if possible buy on a quality basis.

To the Railways and Express Companies.

Handle eggs with care.

Provide suitable accomodation.

Guard against undue exposure to heat and cold.

Deliver with all reasonable despatch to the consignee.

To the Dealers and Packers.

Indicate to the producer that, financially, quality counts for more than quantity.

Adopt without delay a basis of "quality payment." The system of "average payment" on a case count basis permits of a great deal of the carelessness and dishonesty that exists in the egg trade.

If the packers were to adopt the method of "quality payment" in its fullest sense the store-keepers and collectors could not afford to take eggs from producers regardless of quality.

To the Retailer.

Buy eggs of assured good quality. If it is necessary to handle inferior eggs, sell them for what they are.

Encourage producers to forward their shipments direct.

Establish if possible, a brand of eggs, which will, in itself be a guarantee of good quality.

Every city retailer must realize how quickly the buying public of the better class proportions its consumption of eggs to the quality of the product. In fact, there is hardly any class of consumers, however careless, but which will increase consumption when the product is improved.

To the Consumer.

Demand new laid eggs of good size and colour.

Insist that they be clean.

Learn to distinguish between a new laid egg and a stale egg ; a fresh egg and a storage egg.

If bad eggs are furnished, demand retribution.

Be willing to pay a premium for good eggs.

Having purchased eggs do not overlook their perishable nature and give them proper care.

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Many consumers use the product of poor, unhealthy stock, kept in unsanitary surroundings rather than pay a cent or two more for clean, wholesome eggs. This is a direct bid for poor eggs.

The responsibility for present conditions rests in part therefore with the consumer and the whole trade will reap the benefit when the latter insists that he be supplied with nothing but first class eggs.

Conclusion.

Improvement in the care of eggs is important from a financial point of view: in fact it is a business proposition. There is an enormous financial waste resulting not only from the absolute loss of thousands of dozens and the shrinkage in millions of others, but also from the cost of handling, packing and transporting so much worthless or practically worthless product. If the manufacturers and business men in Canada were to take no more care of the articles manufactured by them and no more pains in advertising and in placing first quality goods on the market, than is taken by farmers in handling and marketing eggs ; how long would the average business be prosperous ?

As a result of an investigation of the egg industry in the State of Kansas, seventy-four buyers, handling over nine hundred thousand cases of eggs annually, state that if the farmers of the State of Kansas would deliver eggs to the buyers in first class condition, they could pay two cents a dozen more the year round. Even greater advances have been made by Canadian dealers to the members of Egg circles in the Province of Ontario.

It is deplorable that a product, like eggs, so uniform when produced, in quality and composition, is allowed to deteriorate so seriously through gross neglect, carelessness and a lack of appreciation of its perishable nature.

It is evident that, if eggs are to reach the consumer's table in a fresh and palatable condition, the present antiquated system of handling and marketing them will have to be largely discontinued and more modern business-like methods adopted.

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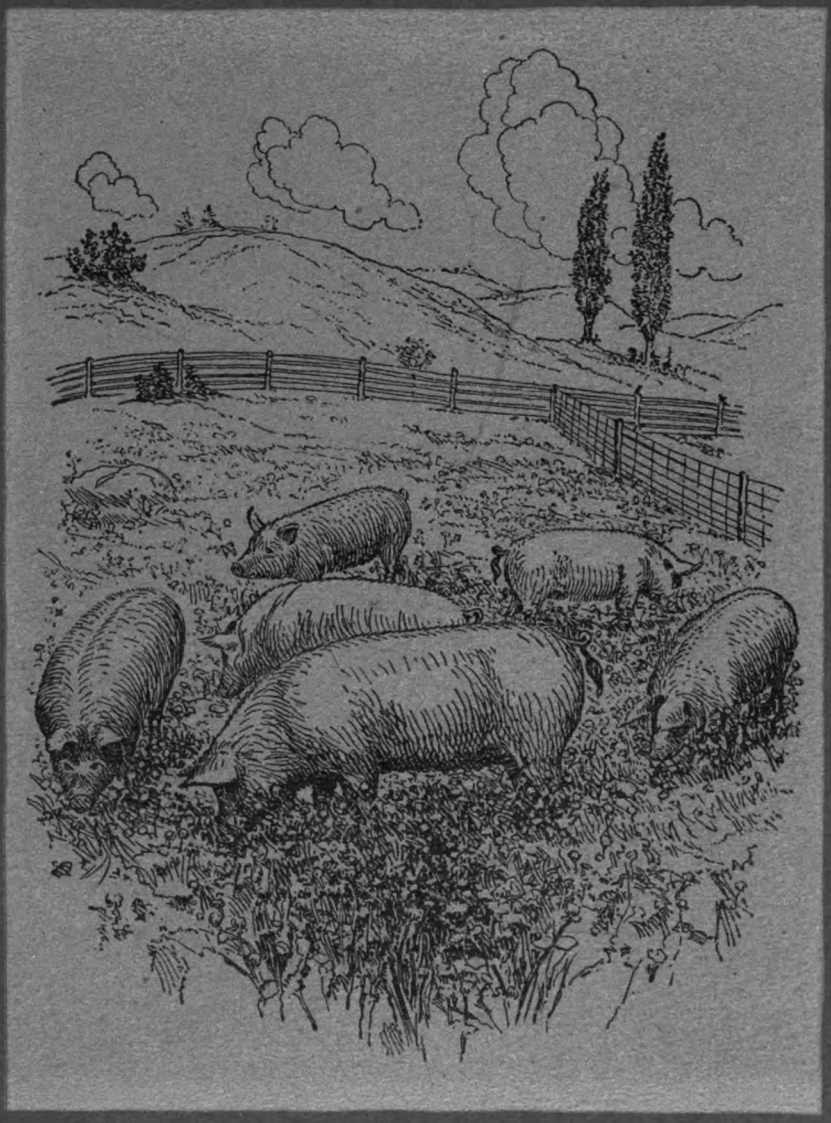
SWINE HUSBANDRY IN CANADA



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DOMINION OF CANADA
DEPARTMENT OF AGRICULTURE
Branch of the Live Stock Commissioner

SWINE HUSBANDRY IN CANADA

BY

J. B. SPENCER, B.S.A.

Bulletin No. 17

Published by direction of Hon. MARTIN BURRELL, Minister of Agriculture, Ottawa, Ont.

AUGUST 1, 1914

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July 1, 1914.

To the Honourable, the Minister of Agriculture.

SIR,—The supplies of Bulletins Nos. 10 and 11 of the Live Stock Branch, dealing respectively with "The Production of Bacon for the British Market" and "The History and Characteristics of the leading Breeds of Swine reared in Canada," have become exhausted.

The revival of the swine industry, more especially in the western provinces, and its importance in all parts of the Dominion, are responsible for a keen demand for reliable literature on the subject. To meet this demand a new bulletin entitled "Swine Husbandry in Canada" has been prepared.

What may be regarded as the standard sections of Bulletins 10 and 11 have been preserved and revised, and to these have been added new material constituting the experience and methods of successful swine raisers in various districts of Canada. New information has also been added on the important question of housing, as well as contributions from officers of the Health of Animals Branch on subjects relating to the health of Canadian swine.

I herewith transmit the copy which has been prepared by Mr. J. B. Spencer, B.S.A., Editor and Chief of the Publications Branch, the author of the two former swine bulletins, issued by the Live Stock Branch, and recommend that it be printed for distribution as Bulletin No. 17, entitled "Swine Husbandry in Canada."

I have the honour to be, sir,

Your obedient servant,

JOHN BRIGHT,

Live Stock Commissioner.

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SWINE HUSBANDRY IN CANADA

THE BACON HOG.

Until the swine raisers in Canada adopted the bacon type as their model, Canadian pork products possessed a very indifferent reputation. Since then a valuable export trade has been built up. In competition with the finest bacon in the world, Canadian bacon commands a price on the British market very close to the top. Its excellence has appealed also to the home consumer until the Canadian market is able to absorb a larger and larger proportion so that less and less can be spared for the export trade. For this reason there should be no relaxation on the part of the breeder to adhere to the bacon model in his breeding and feeding operations.

Hogs, like other classes of live stock, must be judged, first from the standpoint of the market, and secondly from their adaptability to yield profitable returns for food consumed. Form, condition and weight largely determine the appreciation of the market, while on constitution, nervous temperament and feeding qualities, depend the thrift or ability to convert the maximum of large quantities of food into a valuable marketable product.

Happily, in the raising of swine for the bacon industry the interests of the producer and consumer in no way conflict. It was for a time contended by many farmers that it cost more to produce the bacon hog than the animal of the thick fat type. The results obtained at experiment stations, supported by the experience of many extensive and successful breeders, have all gone to show that, if anything, the contrary is true. In experiments by Prof. Day, at the Ontario Agricultural College, out of six groups of pigs, the groups scored first and third by the packer on the basis of their adaptability for the export trade, were first and second in economy of gain.

It cannot be denied that more skilful breeding and feeding is required to produce the bacon hog, but it does not necessarily require more food to produce a pound of gain than is required by hogs of other types.

The hog required for the production of the Wiltshire side is illustrated in Figs. 4 and 8. In weight he shuold be not less than 170 pounds nor more than 220 pounds, the most desirable weight being from 180 to 200 ponuds alive when fasted.

As will be seen, he is a smooth, trim, evenly-developed pig, of great length, fair depth and moderate thickness. Described in detail, he should conform closely to the tollowing:—

Head.

Snout should be for the breed moderately fine and of medium length. A very short stubby nose is usually associated with a short, thick body; on the other hand, a very long, narrow snout and head, like a long face on a steer, generally indicates poor feeding qualities.

Ears should be fine in texture, firmly attached and alertly carried. A coarse and loosely-carried ear indicates a sluggish temperament, delicate constitution and poor feeding qualities.

Eyes.—The eye is an excellent index of the health and also of the nervous temperament. Any departure from the normal in health and vigour will be indicated as quickly and surely by the eye as by any other organ. A small sunken, dull eye is an almost unfailing indication of a sluggish circulation and low vitality; a wild flashing eye indicates a nervous disposition that is highly undesirable; eyes of good size and prominent, bright but placid, indicate health, docility and good feeding qualities.

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Jowl, light, trim and neat. A large flabby jowl is objectionable, not only because it is of little value, but it is usually associated with excessive fat and flabbiness throughout.

Neck, of medium length, and showing no tendency to arch on top. A pig with an arching neck will cut too thick over the top of the shoulders. (See Fig. 8.)

Fore Quarters.

Shoulders, light and smooth. They should be very compact on top, and no wider than the rest of the back. It is important that the shoulder blades be upright; it is not enough that a pig be long from tip to tip, he must be long from shoulder blade to ham. Some apparently lengthy pigs will cut a short side of bacon, because of faulty conformation of the shoulder, the shoulder blades being too oblique and running back too far into the side.

Breast, of good width and full, indicating a large chest with plenty of room for vital organs. Sometimes the apparent width of the breast is increased by faulty attachment of the forelegs, they being tacked on, so to speak, on the outside of the body. This conformation is always accompanied with a rough shoulder.

Forelegs, set well apart without going to the extreme already spoken of, medium length and straight; pasterns strong, upright and moderately fine. The legs should be of fair length. Nature insists on preserving a certain measure of symmetry or co-relation of parts, and a short-legged animal is usually a short-bodied animal. It is hard to get them long and low; and since our aim is to breed for long sides, we must be willing to allow a corresponding length of leg. Excessively fine bone is usually associated with a tendency to fatten at the expense of growth, and this, of course, is fatal to the production of the Wiltshire side; on the other hand, very coarse bone is indicative of general grossness throughout, and is therefore undesirable.

Body.

Back, of medium width, rising slightly above the straight line, and forming a slight arch from neck to tail. A sagging back indicates a lack of muscle or lean meat throughout. Note the excessive fat and lack of lean flesh or muscle down the back in Fig. 7.

Sometimes a pig will show a drop in the back just behind the shoulder. This often indicates a weak constitution. The back should be nicely rounded from side to side, and of medium width. A broad, flat back is usually associated with a short, thick, chunky conformation throughout. On the other hand the ribs should not fall away too abruptly from the backbone, giving the formation known as a "herring back." A back of this description will, on cutting, be found to be bare and lacking in muscle or lean flesh.

Loin should be strong and full, but not unduly arched. It should be of the same width as the rest of the back and well covered with flesh.

Side.—Since the side is the most valuable part of a bacon hog, it should be long, smooth, and filled out even with the shoulder and ham; it should be deep enough to provide for constitution, but not so deep as to give an excess of thin, flabby belly meat. See Figs. 4 and note length of side from shoulder to point of ham; note also the trim, firm belly and entire absence of flabbiness. Fig. 6 shows a Wiltshire side of the type that commands the highest price on the English market; contrast Fig. 5 with Fig. 6. The former are worth 50 cents per hundredweight live weight more on the Canadian market than the latter. The first sells readily on the English market, while the other is almost unsaleable.

Heart-girth should be full, indicating constitution; the fore flank should be well let down and full behind the elbow. The packer could not object to a slightly tucked-up appearance behind the forelegs, but it is a fault that the breeder and feeder cannot afford to overlook. This is an opportune time to sound a note of warning to

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Canadian breeders. There is a noticeable tendency toward over-fineness with lack of vigour to be seen in many of our breeding herds. Judges at exhibitions are in part to blame for this. In too many cases undue stress is laid on smoothness of shoulder, length of side, shapeliness of ham, etc., while those features of the conformation that indicate constitution are apparently ignored. This is quite right in bacon classes; these should be judged wholly on their adaptability to the requirements of the consumer, but in judging breeding classes the interests of the producer must not be overlooked or even be placed second to those of the consumer. Fortunately the two can be easily harmonized; the depth and fullness of the chest and fore flank necessary to give room for the vital organs do not imply roughness of shoulder, shortness of side, or paunchiness of belly, or in any other way detract from the value of the carcass.

Hind flank, well let down and full, giving a straight underline, which should be markedly trim and neat, showing no flabbiness.

Hind Quarters.

Rump should be the same width as the back, of good length, and dropping gradually from the loin to the tail, and nicely rounded over the top from side to side.

Ham, very trim and neat, tapering gradually to the hock, heavily muscled and firm. Any tendency to flabbiness or folds is very undesirable. Fig. 7 shows an ideal ham hung up; note that it is medium in size and tapers evenly down to the hock.

Hind legs, firmly and squarely set with hocks tolerably well apart but not bowed outward; the bone should be clean and moderately fine, and the pasterns upright and strong. They should be of medium length, as already mentioned in describing the forelegs; a very short leg usually indicates a short, compact conformation throughout, while excessive length of leg is often associated with poor feeding qualities.

Quality is a general term somewhat hard to define, but readily recognized by the experienced stockman. To say that a pig has lots of quality is to imply that his general appearanace denotes good breeding; that he has a clean-cut, trim, tidy, attractive appearance, with no sign of coarseness as indicated in the bone, skin and hair; that he is symmetrical, no part abnormally developed; and that he is active in his movements, but neither wild, cross nor restless.

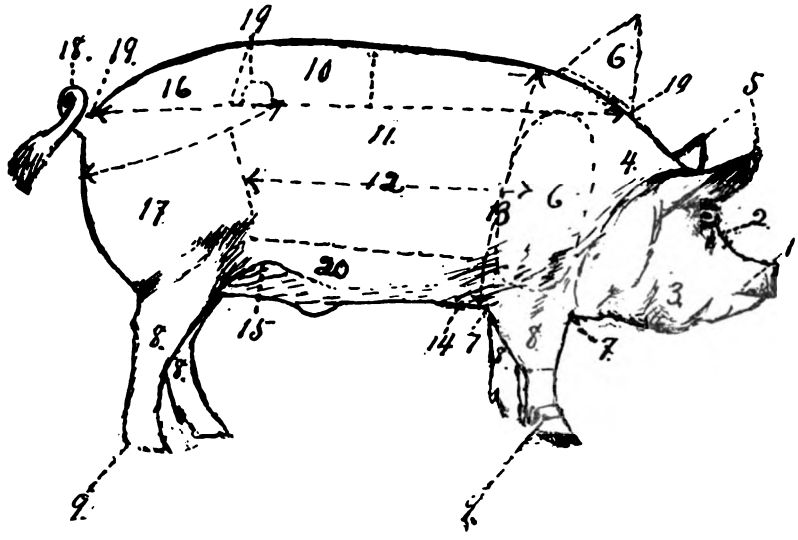

FIG. 1.—DIAGRAM SHOWING LOCATION OF POINTS OF THE HOG.

1. Snout.	5. Ears.	9. Pastern.	13. Girth.	17. Ham.
2. Face.	6. Shoulder.	10. Loin.	14. Fore Flank.	18. Tail.
3. Jowl.	7. Chest.	11. Ribs.	15. Hind Flank.	19. Back.
4. Neck.	8. Leg.	12. Side.	16. Rump.	20. Belly.

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UNDESIRABLE HOGS FOR BACON PRODUCTION.

There are a number of classes of undesirable hogs being marketed for bacon at all seasons of the year. These include unfinished, overfat, prematurely finished hogs, and sows that have been used for breeding purposes. Of these the unfinished animals are most objectionable, and during most seasons are marketed in numbers out of all proportion to what they should be.

Unfinished Hogs.

According to reports from a number of the large packing companies, the proportion of unfinished hogs is much too large, running at times as high as 15 per cent of the total receipts at packing houses in central Ontario, 20 per cent in Eastern Ontario and Quebec, and about 15 per cent in Western Ontario. In the western provinces proportionately fewer light hogs are marketed, the tendency being to err in the opposite extreme. The marketing of their hogs is a very serious matter from the standpoint of all concerned, as such pigs dress poorly, giving a low percentage of carcass, and they make such inferior meat that the reputation of Canadian bacon stands in danger of serious injury if many of these pigs are sent forward as bacon.

Why hog raisers persist in sending this unfinished stuff to market is not easy to understand, unless it is the comparatively high price of coarse grains which are necessary in finishing these animals, and perhaps in some cases a fear that the high values for hogs which have prevailed for some time would suddenly drop. These, however, are not valid reasons when the injury such animals do the trade is considered. The "grass" or unfinished hog is a serious menace to the bacon industry, and the time has come when the farmers, the buyers and the packers ought to co-operate against him.

One of the leading Canadian pork packers and exporters, speaking of the objections to the unfinished hog, says: "He won't make good bacon; he is an unprofitable hog to ship alive, an unprofitable hog to slaughter, and when he is made into bacon it is thin and tough and has to be sold at a heavy reduction on select goods." Another packer says: "The thin unfinished hog is not a bacon producer at all, and should be kept back and fed up until it weighs not less than 180 pounds. When thin sides are converted into bacon they invariably cause trouble as well as direct monetary loss." Still another packer expresses his views upon the light hog. He says: "The chief objection to unfinished hogs for bacon is that they shrink in killing about 5 to 8 per cent more than when they are finished, which consequently makes the bacon so much dearer; and in the Old Country they do not want sides weighing less than 50 pounds, which means that the hog must be at least 160 pounds and in good flesh in order to produce 50-pound sides; anything below 160 pounds makes bacon which is undesirable and hard to sell."

In England the buyers refer to the bacon from thin hogs as "skin and misery." Some of them have become very emphatic in their denunciation of it, stating that the bacon trade has already received serious injury from it, and the sooner it is stopped from being sent over the better it will be for the trade. A hog that is too thin to make bacon of a desirable weight and quality is similar to any other inferior product, inasmuch as it lowers the value of the better goods and seriously injures the trade to which it belongs.

Fig. 2 fairly well represents the class of hogs known as unfinished; these animals are of a good type for bacon production, but they are in only field condition. Fig. 5 shows a side of a thin pig.

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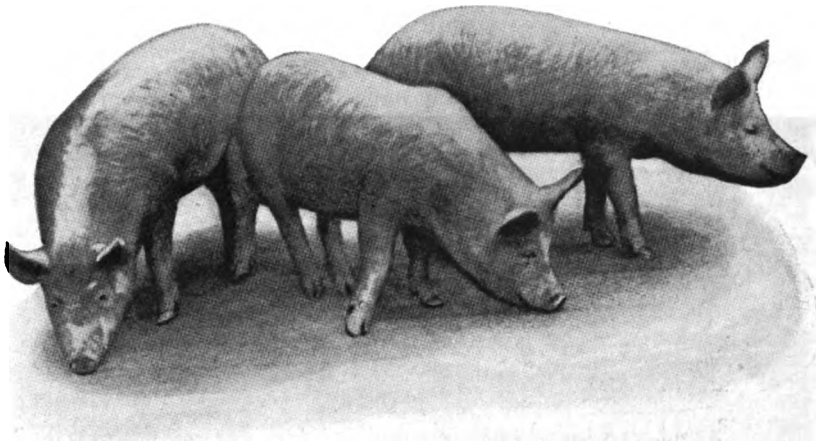

Fig. 2.—Unfinished hogs (from 5 to 7 months old), weighing from 125 to 150 lb. These animals are of good bacon type but have not had sufficient fattening food to properly finish them for the market.

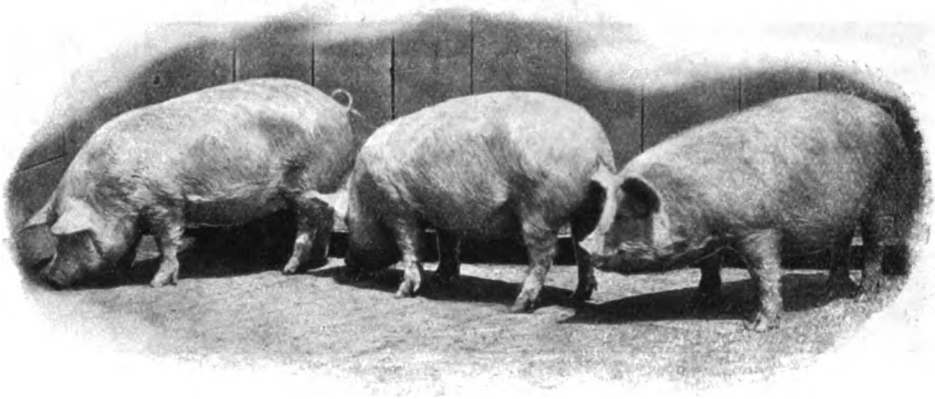

Fig 3.- Hogs too short and fat for export trade, (from 7 to 9 months old) weighing from 200 to 250 lb. These animals have been closely housed and fed an expensive ration which induced fattening rather than growth.

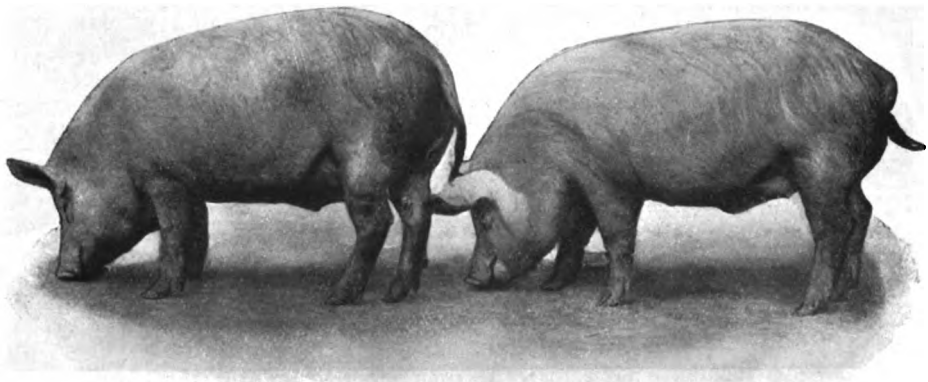

Fig. 4.—Ideal hogs for the bacon trade (from 6 to 8 months old) weighing from 180 to 200 lb. These animals have had sufficient freedom and healthful food to induce rapid growth followed by a short finishing period.

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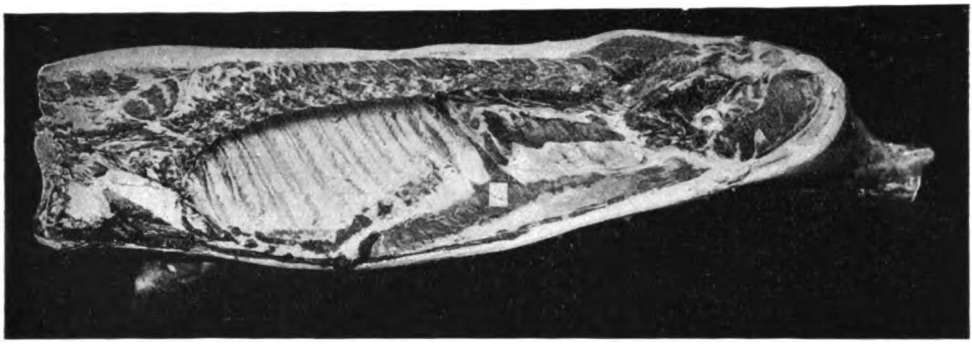

Fig. 5.—Side of unfinished hog. Note the undue leanness, also the shallowness of layer of fat—$\frac{3}{4}$ to 1 in.—along the back and thinness of cut on the lower side.

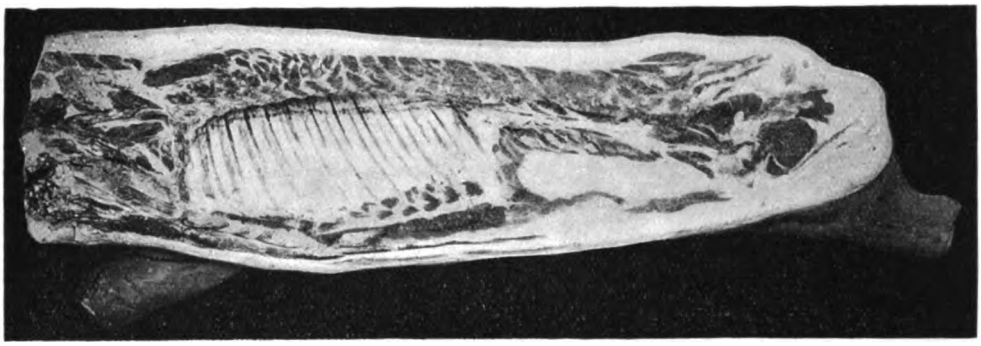

Fig. 6 —No. 1 Wiltshire Side. Note the even admixture of fat and lean meat, also the uniformity and depth of layer of fat—$1\frac{1}{2}$ to 2 in.—along the back from end to end of side.

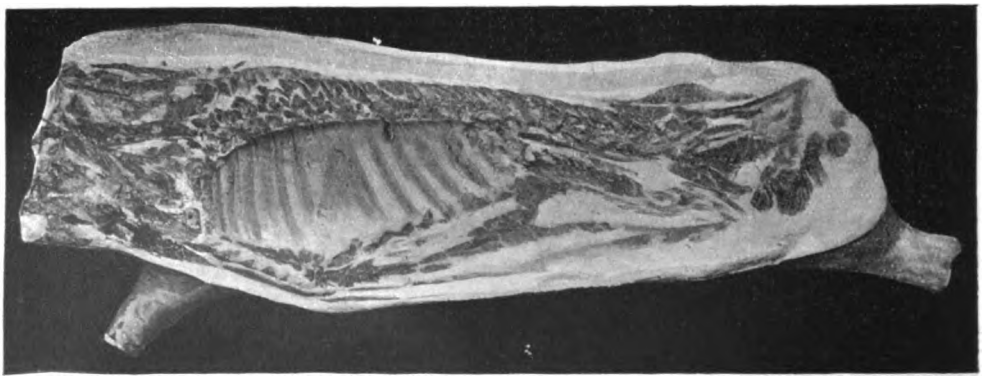

Fig. 7.—Side too thick and fat. Note the excessive depth of fat—$2\frac{1}{2}$ to 3 in.—along the back.

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Overfat Hogs.

Notwithstanding the fact that the overfat hog has been preached against for years by those interested in the development of the high-class bacon trade, and the fact that the price paid for these animals is frequently cut to the extent of one-quarter of a cent to one-half cent per pound for the live hog, the supply of overdone animals continues much too great, more especially during the late fall and winter season. The demand for the pork from such animals is becoming less and less, and as a rule the bacon from such hogs will have to be sold at say an average of 5 shillings per 112 pounds less than prime lean. Why these animals are kept so long at the trough is a mystery unless it is to catch an improved market. It seems to be an overlooked fact that the last few pounds of an overfat hog are produced at a much greater relative cost than the same number of pounds added to an animal approaching the finished condition. It is therefore clear that a feeder who holds his hogs beyond the finished stage does so at a loss even though he receives an advance in price and is not docked for overfatness—results not often secured by holding. There is no doubt that these hogs rob the feeder. Feeding experiments have shown that hogs do not give good returns for food consumed after they have passed the finished condition. (See table under "Cost of Gain and Different Stages of Growth," page 36.)

The marketing of hogs that exceed 220 pounds live weight should be discouraged for the production of bacon, as such causes loss both to the producer and the packer. Fig. 3 represents the overfat hog, while Fig. 7 shows the class of side he produces.

Prematurely Finished Hogs.

Another undesirable class of hogs for the production of fine bacon is the prematurely finished pigs weighing from 145 to 160 pounds live weight. These are doing much to injure the reputation of Canadian bacon. As a rule, the animals of this class are pleasing to the eye, they kill out a high proportion of meat to the carcass, and they satisfy the palate of the consumer, especially when eaten fresh, but when made into bacon they do not fill the requirements of the market. The size is objectionable to the buyers; packers tell us that this class of goods cannot be sold at a profit on the London market. For this reason it is decidedly unwise to force hogs along to the finished state that have not had time to attain a weight of at least 180 pounds.

There is a demand for bacon made from these light, well-finished pigs, but it is so limited that there is always danger of an oversupply, when the price is sure to fall several shillings per hundredweight, and the stock becomes a drag on the market. The pig of this class is not the fault of the breed to which it belongs, nor the character of the animal, but rather to the over-generosity of the feeder who has kept his charge confined in close quarters and forced it along from an early age to the finished animal of short dimensions and insufficient weight at from 4 to 5 months old.

Sows.

Too many of the cargoes of hogs that arrive at the packing houses contain more or less of sows that have reared one or more litters of pigs. These can rarely be used as bacon producers; the great majority are not bacon animals and never should be sent to market in "bacon" condition. As a rule, those that are not heavy are too thin in flesh, and therefore may be classed as unfinished; and those that are well enough fleshed are too heavy to yield sides suitable for the bacon trade. The presence of so many of these sows in shipments of bacon hogs is largely due to the too common but unwise practice of turning off brood sows while still young instead of allowing those that are promising to remain in the herd as matrons for a number of years, making good mothers of large litters. While it is true that some first litters turn out to be well-doing, vigorous animals, the great bulk of them are not so strong as litters from older sows. To continue to breed only from these immature sows, turning them off

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after the first litter, is to perpetuate weakness rather than strength in the individuals of the herd, which will in time show itself in a race of swine that are not good thrivers, and are prone to ailments and weaknesses that will seriously interfere with profitmaking in pig rearing. To market young brood sows in medium flesh is to injure the bacon industry both directly and indirectly—directly in lowering the average quality of our bacon, and indirectly in weakening the constitution of our bacon herds.

The question will arise: what is to be done with the animals that have outlived their profitable usefulness in the breeding herd? It has been shown that it is not in the interest of the industry to turn them off as bacon animals. It is the animals of this class that may be depended upon to supply the heavy pork and lard trade, and for this purpose they should be made thick fat. How to make them so at a profit is a question of importance. A thin sow placed in a pen and fed almost exclusively on grain will, in all probability, "eat her head off" before she is thick fat, but there are better ways of fattening such an animal. The diet of an old sow or "stag" should be composed largely of such cheap foods as mangels and sugar beets, if in season, or pasture crops such as clover, alfalfa, rape, etc.; a vigorous sow or stag getting an abundance of any of these foods will gain rapidly, and if given a moderate grain ration will soon be fit for the market.

The best time to place a thin sow in the "feed lot" is in the early summer after her spring litter has been weaned and she has dried off. If turned on a luxuriant pasture and given a small grain ration, gradually increasing it, she will, as a rule, in from eight to twelve weeks be fat enough to meet the requirements of the market. While the gains made by such an animal have cost high per hundredweight, it should be remembered that she has given a profit many times over as a mother, and it is the last hundred or two of gain that renders her entire carcass of marketable value.

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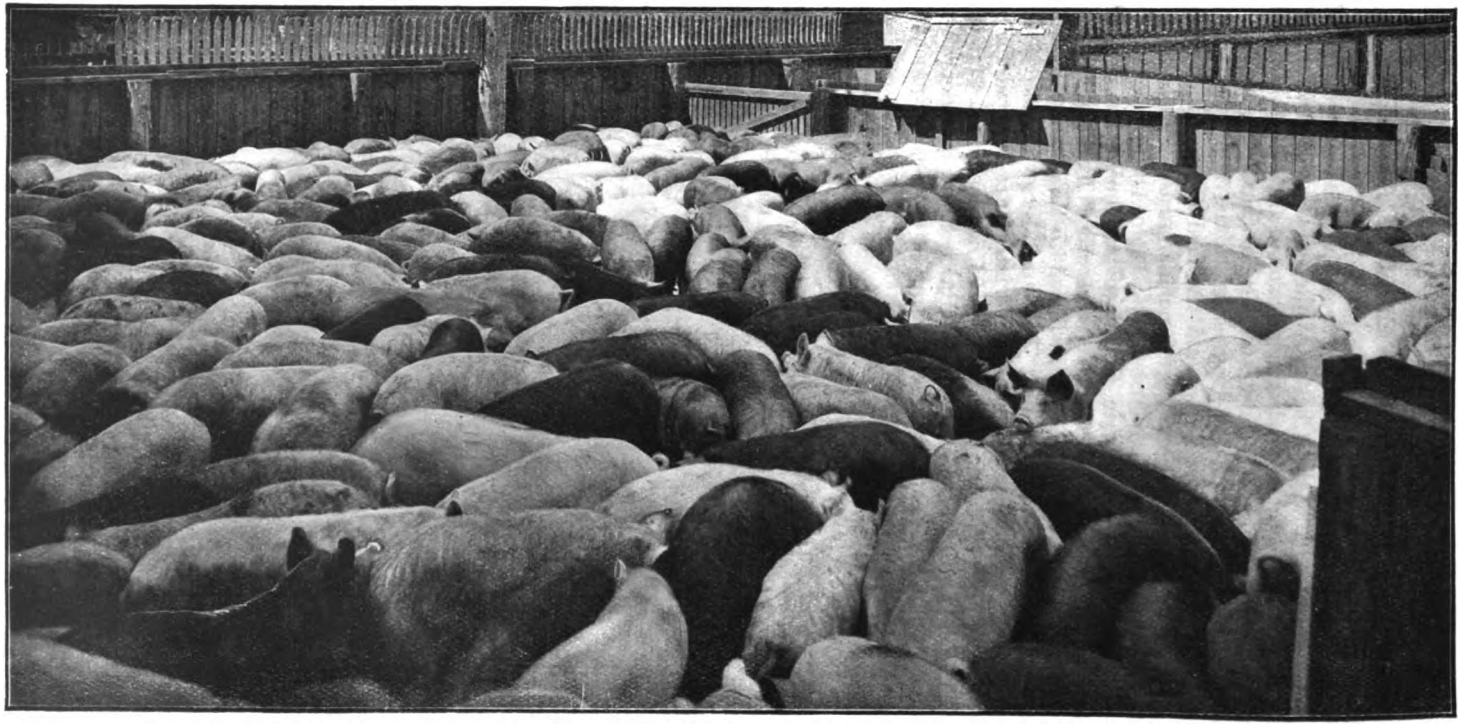

Fig. 8.—A shipment as received at a Toronto packing house—about 85 per cent of these suitable for prime bacon.

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BREEDS OF SWINE IN CANADA.

The breeds of swine most commonly bred from in Canada are the Yorkshire, the Tamworth, the Berkshire, and the Chester White. The Poland-China, the Duroc-Jersey and the Hampshire are also bred to some extent. The Yorkshire and the Tamworth are recognized as being especially suitable for bacon production; while the Berkshire, the Chester White and the Hampshire of the improved type occupy an intermediate position between the bacon and the lard types. The remaining two belong to the fat or lard-producing class, very popular in the corn belt of the United States.

The relative numerical standing in Canada of the breeds named is fairly well indicated by the fact that in 1913 there were recorded by the Dominion Swine Breeders' Association pedigrees of 4,414 Yorkshires, 3,704 Berkshires, 706 Tamworths, 1,288 Chester Whites, 477 Poland-Chinas, 731 Duroc-Jerseys, and 189 Hampshires. Members of the Dominion Swine Breeders' Association are charged for registration of pedigrees, including certificate, 50 cents each; non-members, $1; transfers, 25 cents each. The cost of membership in the Dominion Swine Breeders' Association is $2 per annum. Application forms, giving rules of entry, may be procured from the Accountant, National Live Stock Records, Ottawa.

THE YORKSHIRE.

The Yorkshire hog of to-day is claimed by historians of the breed to have descended almost directly from the old English hog common in the northern counties of England as far back as the beginning of the eighteenth century. This hog was long in head and body and stood high off the ground. He was narrow in body, coarse in bone, had very large ears, and took a long time to mature.

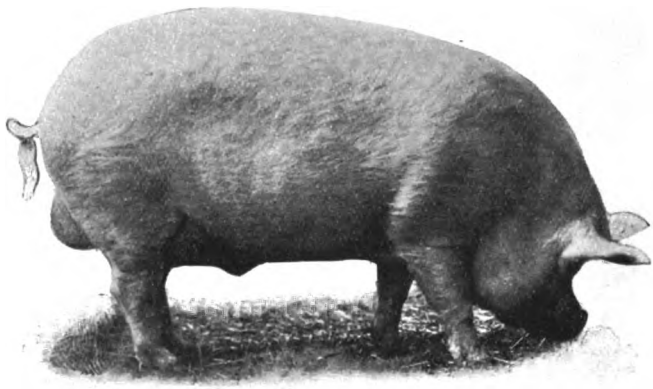

Fig. 9.—Yorkshire boar.

Little was done to improve the breed until about 1760, when Robert Bakewell, the famous stock improver of that time, is said to have applied the principles by which the English Leicester sheep was evolved from the old type. This was to perpetuate only the smaller, finer and more compact animals, which he found had a greater aptitude to fatten than the more rangy and coarser types. Some authorities claim also that the Yorkshire was much helped by the introduction of crosses of the White Leicester, a breed of swine of a finer and thicker type than the Yorkshire was at that time.

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There appears to be comparatively little knowledge of the improvers of the breed during the early part of the nineteenth century, but it is probable that many farmers had a hand in the work. The Yorkshire man, as is well known, is a lover of good stock, and it is not surprising to find that the swine kept in the county of York were equal, if not superior, to those found in any other part of the country. With the advent of competition at the district week-end fairs, the general farmer was incited to improve his stock, until, some fifty years ago, it was not unusual to find the displays of pigs at the best of those fairs quite as good as those seen at much larger shows in other districts. Unfortunately, the classification at the district meetings was not such as tended to purity of breeding, the prizes very frequently being offered for the best pigs of a particular colour, which in Yorkshire was chiefly white. This led breeders to pay close attention to the securing of size, easy fattening and early maturing qualities, irrespective of those points which are looked for in an established breed. The improvement effected was marked and rapid, and owners were able to bring out heavily-fleshed boars and sows of fine quality for the classes limited to pigs under 6, 9 and 12 months old—classes which were looked upon with special favour by the exhibitors at the district summer shows.

Owing to a lack of unison on the part of breeders, improved animals found in different localities and in different herds were of quite dissimilar type; and it was not until about 1860, when a classification for Yorkshires was provided by the leading shows, that the type of the large Yorkshire was well fixed.

The improved Yorkshire is one of the largest breeds of swine. It is longer than any of the others, but its thickness is not so great as those breeds which have been developed chiefly for heavy weights and the production of fat. It grows rapidly and the quality of its meat is unexcelled, as its long, deep sides produce much bacon of the desired lean class.

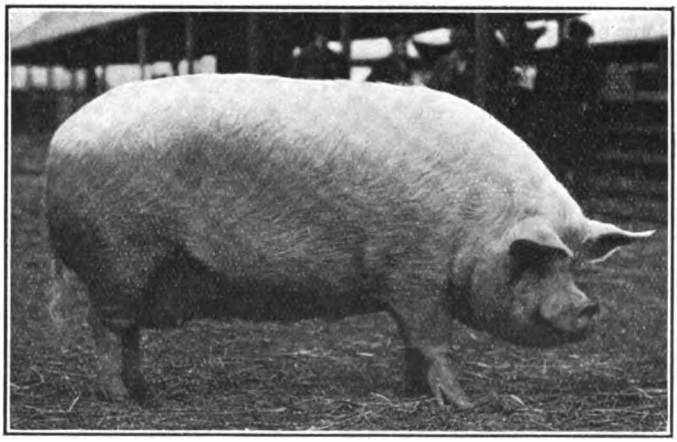

Fig 10.—Yorkshire sow.

For crossing or grading purposes, the improved Yorkshire is unsurpassed on account of its size, vigour, muscular development and other desirable qualities which it strongly transmits to its offspring. The sows have large litters of uniform size, of which they rear a good proportion. They seldom become clumsy at farrowing time, a vicious dam is almost unheard of in the breed, and they are excellent nurses, while the young are vigorous from the first.

Improved Yorkshire swine have been imported into Canada for many years. Many specimens of the early importations, and of even those brought out as late as 1890, were of the coarse, rangy, slow-maturing sort. Where these were distributed the Yorkshire breed did not grow in favour. In recent years, however, the tendency has

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been to revert somewhat from the extreme length and size which were held in favour by the early breeders of bacon pigs, until the modern Yorkshire is a smooth, lengthy animal that matures fairly early and makes very economical gains either in the pen or on pasture upon the food it consumes. Animals of this breed are active and yet gentle in disposition, and they very rarely go off their feet. A mature boar in show condition should weigh not less than 700 pounds, and a mature sow 600 pounds. Well-nourished pigs from 6 to 7 months old should reach a marketable condition weighing from 180 to 220 pounds.

The Yorkshire is white in colour. Black spots on the skin do not disqualify, but the aim of the breeder should be to reduce these to a minimum. The presence of black hairs is regarded by authorities as to justify disqualification.

The typical Yorkshire is long and deep in proportion to width; symmetrical and smooth; its back is slightly arched; the ribs well sprung; its underline and sides trim, straight and level, and its body is firmly supported by well-placed legs of medium length.

The points of excellence for Yorkshire swine should conform as nearly as possible to the requirements of the bacon trade, with due regard for constitutional vigour and easy-feeding qualities.

THE TAMWORTH.

The Tamworth is probably the purest of the modern breeds of swine, it having been improved more largely by selection and care than by the introduction of the blood of other breeds. One historian claims that foundation stock was introduced into England from Ireland by Sir Robert Peel about 1815, but others speak of its being plentiful in the Midland counties of England previous to that date. Sir Robert Peel is said to have maintained a herd of this sort near the town of Tamworth (from whence the breed takes its name), in South Staffordshire, until the time of his death, in 1850.

During a long period the breed was little seen outside of the counties of Leicestershire, Staffordshire and Northamptonshire. It was at that time a dark red and grisly

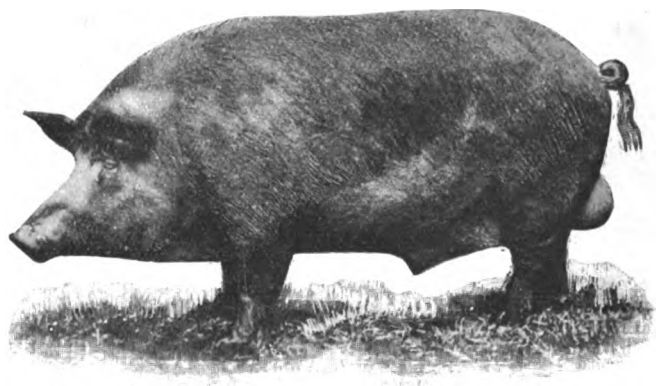

Fig. 11.—Tamworth Boar.

animal that was able to thrive on pasture during the summer and beachnuts and acorns found in the forests, during the fall and early winter. The original stock was long in the limb, long and thin in the snout and head, and flat in the rib. The pigs were active, hardy, good grazers and very prolific, but were slow in maturing. Being rather spare in body they carried very little fat, and when fatted and slaughtered they are said to have produced a large proportion of flesh.

In later times, after the country had become inclosed and land began to be brought under cultivation, a quieter pig, with a greater disposition to fatten, was desired. In the effort to produce such an animal, crosses of pigs having a strong infusion of

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Neapolitan blood were introduced. It is also said that a few breeders used a white pig that had been improved by Bakewell. The result of the mixture was a black, white and sandy pig. In the hands of breeders in certain districts of Staffordshire, all but the red or sandy colours were bred out, and pains were taken by selection to increase the feeding qualities of their pigs, and by the middle of the last century a very desirable class of pig had been evolved. It is claimed on good authority that a sow of the Tamworth breed won first prize at the Northampton show in 1847 in a class which included Berkshire, Essex and other improved breeds.

Fortunately the class of men who had undertaken the improvement of some of the other breeds, by sacrificing almost everything to an aptitude to fatten, did not undertake the Tamworth; hence the preservation of the length and prolificacy of the breed. Improvement was accomplished by reducing the length of limb, increasing the depth of body, and improving the feeding qualities of the animals.

For a number of years previous to 1870 the breed received comparatively little attention outside its own home. About that time the bacon curers opened a campaign against the then fashionable, short, fat and heavy-shouldered pigs, which they found quite unsuitable for the production of streaked side meat for which the demand was constantly increasing. The Tamworth then came into prominence as an improver of some of the other breeds, in which capacity it was a decided success owing to its long-established habit of converting its food into lean meat. This breed at once assumed an important place among the best sorts in Britain. Tamworths were given a separate classification at the Royal and other British shows about 1885. In general outline they are long, smooth and fairly deep, having a moderately light fore end and deep ham; their carriage is easy and active on strong, straight legs.

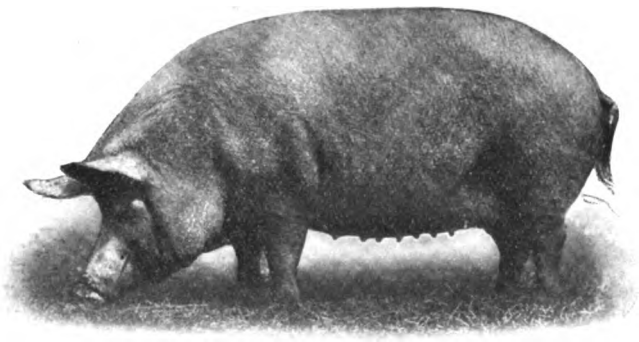

Fig. 12.—Tamworth Sow.

In colour the Tamworth is golden red, on a flesh-coloured skin, free from black spots.

The Tamworth belongs to the large breeds, reaching weights almost equal to the Yorkshire. Mature boars in show condition should weigh from 650 to upwards of 700 pounds, and sows about 600 to 650 pounds. Sows and barrows that are wisely and well reared are ready for the packers at about 7 months of age, weighing from 180 to 200 pounds.

The points of excellence for the Tamworth, as in the case of the improved Yorkshire, should conform as nearly as possible to the requirements of the bacon trade, without overlooking constitutional vigour and easy-feeding qualities.

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THE BERKSHIRE.

The Berkshire is one of the oldest of the improved breeds of swine. More than a century ago it was bred in large numbers in and about the county of Berkshire, England, whence it obtained its name. At that time it was a large animal, somewhat coarse in body, and having large pendent ears. In colour it varied from tawny to reddish brown, with black spots. Early in the nineteenth century the breed underwent considerable improvement, both in Berkshire and in the adjoining counties. It is claimed by historians that improvement was effected by the introduction of crosses of the finer Chinese and Neapolitan breeds and the perpetuation of the finer types found in English herds. About the year 1825 the breed had assumed a fairly uniform and desirable type, and the darker colours began to be quite general.

It was not until 1862 that the breed was given a separate class at the show of the Royal Agricultural Society in England. Soon after this, competition in the show ring became keen between the various improvers of the breed, each confining his exhibits to animals of his own breeding. The benefits derived from this were very marked, and it was not long before the breed reached a point of excellence that would be highly

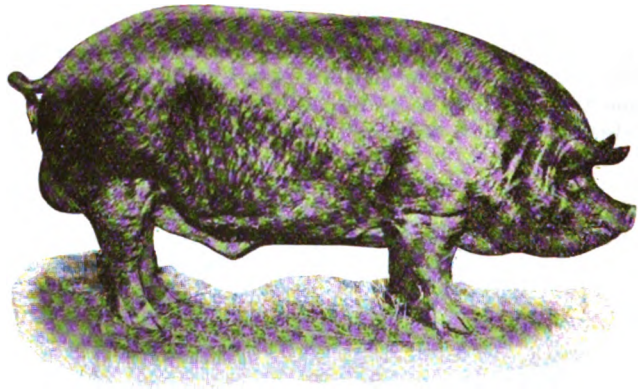

Fig. 13.—Berkshire Boar.

prized at the present time. They were of fine appearance and very hardy, of good size and length, and yet without coarseness. The sows were prolific and the offspring vigorous. They matured early, producing a thick carcass of lean meat of fine quality by the time they were 12 months old. Up to this time the improvers of the breed were not so anxious about external markings as the commercial value of the animals; under these favourable conditions a very desirable class of hog was produced. The excellence of the breed became so marked that it attracted the attention of rich men, who soon became its fanciers and exhibitors and whose first thought too frequently was the production of prize winners of such a type and formation as pleased their whims. High prices were paid for certain extreme types, which naturally set breeders endeavouring to produce the kind that found favour. During this period the breed was undergoing an undesirable change, which was fostered still more by a keen demand for show animals from buyers in the United States. The main aim of these importers was to secure prize-winning animals, or such as conformed to their fancy. The chief points aimed at were a short turned-up snout, heavy jowl, thick neck, wide shoulders and a fat back. The colour of the present day Berkshire was at that time fairly well established in the breed, although a white splash on the side and reddish marks about the body were not uncommon.

With the advent in the United States of the thick fat Poland-China, the demand for imported Berkshires dropped off very considerably, and English breeders com-

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menced to give attention to lengthening the form of their stock. Towards the end of the past century the breed had become considerably lengthened, and as a result we have the symmetrical, fairly long, fleshy type of Berkshire. While this breed retains its popularity in Canada in a marked degree, it can not as yet be said to have become entirely suited to the requirements of the packers. Numbers of breeders still adhere to the lard type, while many others are perpetuating only the longer and more fleshy representatives of their herds. For bacon production a cross between the Berkshire and the Yorkshire or Tamworth finds favour with both the producer and the packer. The Berkshire is an easy feeder, quite hardy and fairly prolific. It is not as large at maturity as the Yorkshire or the Tamworth, but it attains heavy weights when selected and reared with a view to size.

The Berkshire is black with white on feet, face and tip of tail. An occasional small splash on the arm is not regarded as an objection. A large white spot on the jowl, shoulder or other part of the body is regarded by most breeders as objectionable.

Mature boars in show condition should weigh not less than 550 pounds, and

Fig. 14.—Berkshire Sow.

mature sows in similar flesh not less than 450 pounds. The Berkshire requires about seven months of moderate feeding in order to be ready for the export bacon trade, weighing about 200 pounds.

In general outline the Berkshire is moderately long and deep; the body is symmetrical and proudly carried on strong, well-placed legs.

THE CHESTER WHITE.

The Chester White hog is a native of Chester county, Pennsylvania, where the breed originated early in the nineteenth century. It was a large, white, coarse animal, having coarse head, heavy, lopped ears, coarse hide, long heavy tail and coarse hair. An improvement of the breed was commenced by the introduction, on a farm near Brandywine Creek, in Chester county, of a pair of very fine white hogs imported from Bedfordshire, England, in the year 1816. Enterprising farmers of the districts commenced an improvement of their swine by the introduction of the prepotent blood of the imported stock. The produce of the first cross was so much superior to the original stock of the country that the new blood was eagerly sought by most of the leading farmers of the district. Encouraged by the improvement already secured, a system of careful selection and breeding was undertaken, with the chief object of securing a more suitable animal for the market. The improvement is said to have been continuous until the breed acquired an enviable reputation over a wide territory. The demand for breeding stock soon exhausted the available animals. This circumstance

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provided unscrupulous men an opportunity for doing the breed a serious injury. White pigs of all forms and descriptions were bought up and sent abroad as Chester Whites. The reaction was severe, as the breed received an unjustified condemnation. The demand for stock fell off seriously, and breeders of the genuine Chester White were able to again build up their herds. While the stock had undergone much improvement in quality, no attempt had been made to reduce the size. They were classed among the large breeds, and as such they reached the period when their breeders saw the wisdom of breeding to a standard, which they began to do about the beginning of the last quarter of the past century. Since that time improvement has been continuous. It has become one of the most popular breeds throughout the United States on account of its early-maturing and easy feeding qualities. In a few cases Canadian breeders have sought, by selection and management, to develop the form and quality of animal looked upon with favour by the packers, and are now producing an animal intermediate between the bacon and lard types; but as bred in the United States, the Chester White is rather a "corn belt" than a bacon animal. As a grazing hog it is claimed to excel most of the other breeds. It is moderately long, thick and deep and uniform in conformation.

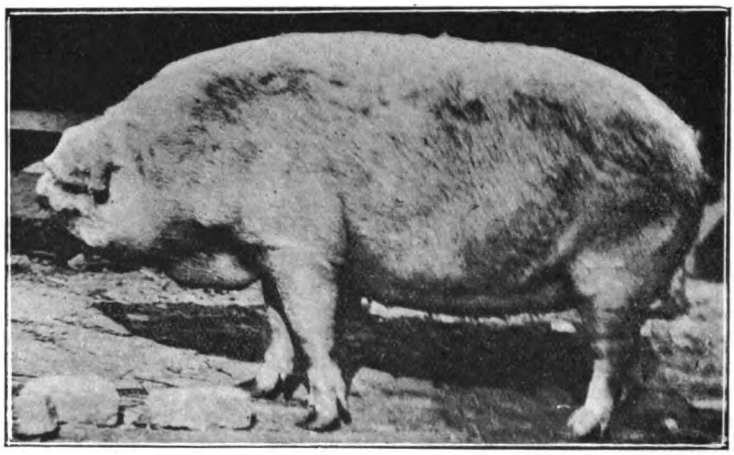

Fig. 15.—Chester White Sow.

The colour is white, no black hairs being admissible. Black or bluish spots on the skin are not uncommon. Breeders aim to avoid these as much as possible. The hair has a tendency to be wavy and even curly in some instances.

Boars in show condition should reach 600 pounds at 2 years of age; and sows of the same age and condition, 500 pounds. Pigs 7 months old in market form should weigh from 180 to 200 pounds.

The standard of excellence for the Chester White, adopted by the various United States Record Associations, calls for an animal having well-arched neck, broad shoulders and back—qualifications undesirable for bacon production. From the standpoint of the Canadian breeder, the standard should be modified to conform to the requirements of the bacon trade, as nearly as is consistent with the natural characteristics of the breed.

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THE POLAND-CHINA.

The Poland-China hog originated in the Miami valley, chiefly in the counties of Warren and Butler, in the state of Ohio. The conditions were favourable to swine growing, and the city of Cincinnati became, prior to the middle of the past century, one of the greatest pork-packing centres in the world. Hog raising was at that time the most profitable feature of farming in the surrounding country. Since there were no railroads at that time fatted hogs had to travel on foot to market, so that activity of the animals was as important as easy feeding qualities. The hogs of the district were known by a variety of names, and were extremely cosmopolitan in their make-up. The foundation stock consisted of the native unimproved hog. Many settlers from Great Britain and other European countries brought hogs of varieties common in the districts whence they came, and in this way a constant change in the stock of the country was affected. With the improvement of roads and the introduction of railways, the activity of the animals became a secondary matter and they rapidly became thicker and shorter in the leg.

While hogs of various types were introduced into the Miami valley, the breeds that did most in improving the stock were the Berkshire, the Russian, the Big China, the Byfield, and the Irish Grazier. From about 1820 to 1840 the main crosses, instrumental in the formation of what later became the Poland-China breed, were introduced. The Berkshire gave the black colour and improved symmetry, the Big China improved the fattening qualities, while the other crosses gave size and strength. According to authoritative writers, no outcrosses have been introduced since 1845.

Owing to the seemingly discordant elements of which it was made up, and the lack of a standard, the breed, then known as "The Warren County Hog," underwent

Fig. 16 —Poland China Herd.

many changes in conformation and colour prior to 1870. Up to this time the growing and fattening qualities of the animals were considered of much greater importance than colour or particular form. Having secured the desired qualities of fattening, leading breeders, about the date mentioned, decided in a general way upon the form and colour most desirable and upon the name Poland-China. Within a few years a number of organizations had been formed in the interests of the breed, and most of these adopted about the same standard of excellence. Attention was given to hastening maturity and to improving the quality and fattening powers, until we now have in the Poland-China one of the most economical meat-making hogs of the great "corn belt" of the United States. Neither its form nor its carcass is in accordance with the requirements of the bacon trade; hence the breed is not looked upon with favour by those closely associated with the development of the Canadian bacon industry.

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In general appearance the Poland-China is compact, symmetrical, full and round, smooth and inclined to massiveness in build. The characteristic colour is black, with white on face or lower jaw, white on feet and tip of tail; a few small clear white spots on body are not objectionable. Boars 2 years old and over in good condition should weigh not less than 600 pounds, and sows of same age and condition not less than 500 pounds.

THE DUROC-JERSEY.

The Duroc-Jersey hog, according to the most authentic historians of the breed, is the outcome of a union of the two classes of red swine known respectively as the Durocs and the Jersey Reds. The latter have been known to exist in a condition of greater or less purity in New Jersey and other Atlantic states for upwards of seventy years, while the former was for a long time the leading hog raised in Saratoga county, New York. The Jersey Reds were large in size, rather fine in quality, and of fair length and thickness. It is believed that the Jersey Red is descended from the earliest importations of the Berkshires, which in their early days were of a variety of colours, including buff, sandy and reddish brown, spotted with black. It is considered probable that the Durocs were descended from the same parent stock, but of this there is less certainty. The two varieties were for many years kept amid different environments which would account for the lack of similarity between them when they were united, at a date prior to 1850, to form the Duroc-Jersey breed.

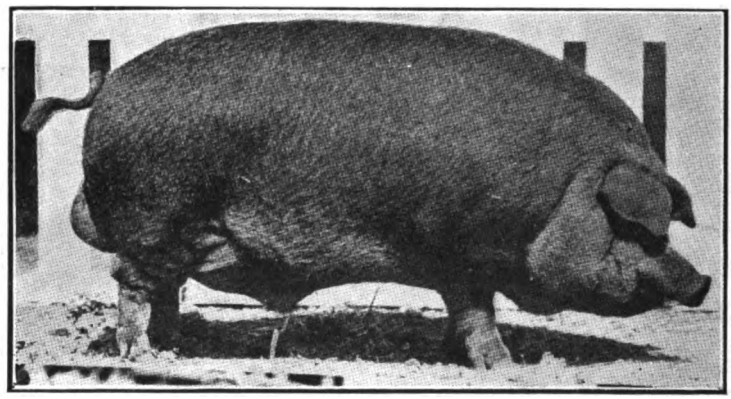

Fig. 17.—Duroc-Jersey Boar.

The breed, from its early days, has been noted for docility, prolificacy and hardihood, qualities which have been well maintained. Size and weight were aimed at by improvers through many generations, and some twenty-five years ago the average of the breed was larger than at the present day. In 1877 breeders in Saratoga and Washington counties, New York, agreed upon a standard of characteristics that has been varied but little by more recently formed record associations. During the past two decades the breed has been improved in quality, easy-feeding and early-maturing propensities, and is now held in about equal favour with the Poland-China and the Chester White in the leading pork-producing areas of the United States.

The Duroc-Jersey has a number of admirers in Canada, but its thick, fat form, as seen in the leading herds of the United States, is so unsuited to the requirements of the bacon trade that its popularity has not extended greatly north of the international boundary.

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The Duroc-Jersey, with its moderately long, straight head, drooping ears, and smooth, neat body, bears a rather close resemblance to the Poland-China in form; it is somewhat stronger in limb. Boars 2 years old in good condition should weigh not

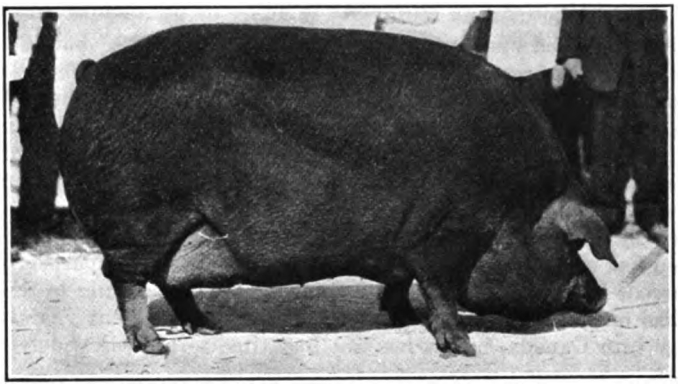

Fig. 18.—Duroc-Jersey Sow.

less than 600 pounds, and sows of similar age and condition 500 pounds. Their colour is cherry red without other admixture.

THE HAMPSHIRE.

The Hampshire belongs to the class of medium-sized hogs. The face is straight, and the ear inclines forward but does not droop like that of the Poland-China. The jowl, shoulder and ham are somewhat lighter than those of a typical fat hog. As a rule, too, it has less width of back, a little more length of side and slightly less depth of side than a hog of the strictly fat class. The breed may be described as somewhere between the bacon type and the fat type in conformation.

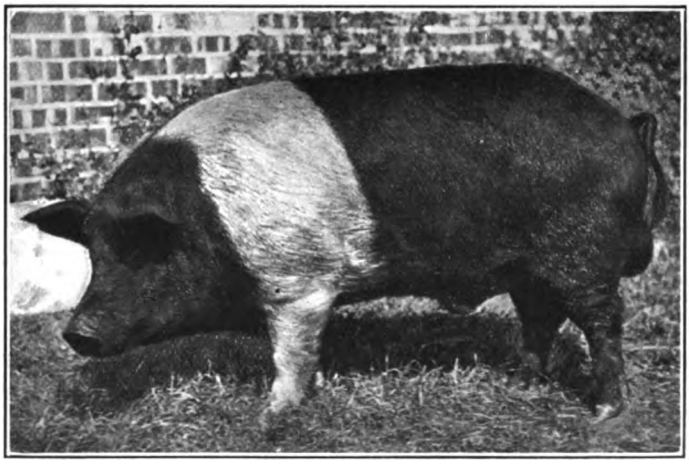

Fig. 19.—Hampshire Boar.

Mr. H. F. Work, at one time secretary of the Breed Association, describes the colour as follows: "In colour they are either listed or blacks, the most fashionable colour consisting of black extremities with a white belt, from 4 to 12 inches wide,

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encircling the body and including the forelegs, which should also be white." The term "listed" refers to the presence of the white belt. Mr. Work also states that there are some breeders who try to run their herds all black, and he claims that breeders should not be too particular regarding colour, with the exception that white spots should not be tolerated.

Originally this breed was known by the name "Thin Rind," but in 1904 the name was changed to Hampshire, which is now the official name of the breed.

According to Mr. Work, the Hampshire traces to pigs brought to Massachusetts from Hampshire, England, about 1820 or 1825. It is said that descendants of this importation were taken to Kentucky about 1825. In any case, the breed has been known in Kentucky for many years, but it seems impossible to obtain definite and reliable information regarding its origin.

As shown by the secretary of the American Hampshire Swine Record Association, the breed has made rapid progress of late years, but in comparison with the older established breeds the number in any one state is not large, owing to the fact that the Hampshire has only recently come into prominence. In recent years the breed has found its way into Canada, but it has not had time to become widely distributed in Canada as yet.

Though Hampshires may vary in colour, they appear to be quite uniform in general type. Possibly, as the breed becomes more numerous and better known, variations in type may become more apparent.

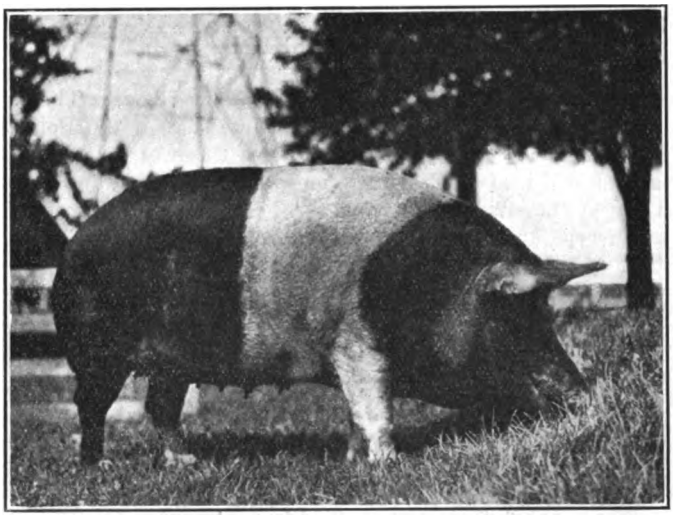

Fig. 20.—Hampshire Sow.

It is generally claimed that the Hampshire is a bacon hog, but in this connection we must bear in mind that what the American packer calls a bacon hog is very different, as a rule, from the hog which is suitable for making Wiltshire sides for export to Great Britain. Judged from the standpoint of suitability for making Wiltshire sides, the Hampshire falls short of requirements, as it is too short in the side, too thick in the shoulder and back, and too heavy in the neck to make a really good Wiltshire side.

In quality of flesh the Hampshire has a high reputation. It has made a good record in the dressed carcass competition at the International Live Stock Exposition at Chicago, and the packers appear to hold it in high esteem. Its flesh carries a high percentage of lean and is generally fine-grained.

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In early maturing and feeding qualities the Hampshire seems to be giving good satisfaction to those who are handling it, and it is highly esteemed as a grazer. It is an active, hardy breed, and there is no apparent reason why it should not give as good an account of the feed it consumes as any other breed.

The Hampshire ranks high in point of fecundity, and is one of the most prolific of American breeds. Its value for cross-breeding is not well known, but it seems reasonable to suppose that it should cross well with the fat types of hogs.—(From "Productive Swine Husbandry," by G. E. Day.)

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THE BREEDING HERD.

No breed or combination of breeds has a monopoly of all the desirable qualities in a pig. "There are good and bad in all breeds, and bad and worse in some." It does not follow that because a hog is of any given breeding he is necessarily a good or a bad bacon hog. It is necessary, therefore, that the breeder of market hogs has a clear-cut conception of the ideal pig; then he will be in a position to make the best of the materials at his disposal by judicious selection and careful breeding.

SELECTION OF THE SOW.

Care should be taken in selecting the females of the herd to choose only those of a quiet, contented temperament. Few things are more exasperating than a roving, noisy, discontented sow; not only is she a continual menace to fences and gates, but she is cross at farrowing time, and is quite as likely as not to destroy half of her litter in a fit of nervous excitement. In addition to this, a sow of this description is seldom or never a good milker, and every stockman knows that the profit or loss on a batch of pigs is determined largely by the start they get in life during the first six or eight weeks. The milking qualities of the sow is a matter too often overlooked or ignored when selecting the females for a breeding herd. Many men seem to take it for granted that if they can get a sow to produce a large litter, she will, as a matter of course, nourish them afterwards. This is a grave mistake. Sows vary in their milking propensities as widely as the cows in an unselected herd. Among pigs the ability to give a large flow of milk is more a family trait than a breed characteristic; that is to say, different families of the same breed differ more in this particular than do the different breeds. It is, therefore, largely a matter of selection. A well formed udder is, of course, essential. There should be not fewer than twelve, better fourteen, well developed, evenly-placed teats, extending well up to the forelegs.

The sow should be large and roomy, with great length and depth of side; she must, however, be trim and neat in her outlines, showing no tendency to bagginess or flabbiness, and, though not wild or nervous, she must be active in her movements. An animal having a heavy, listless, clumsy walk should not be retained in a breeding herd. This indicates a lack of vital force; and an animal with this characteristic is not likely to be so prepotent as one with a more active, sprightly temperament.

The brood sow should be selected from prolific families. A sow must raise a given number of pigs each year to pay expenses, and each additional pig represents a profit. There is, however, a limit to the number of pigs in a profitable litter; very large litters are apt to be weak and uneven in quality. Few sows can properly nourish more than fourteen pigs, and an even litter of from eight to twelve large, strong, lusty fellows is more profitable than a litter of sixteen or eighteen weak, flabby and ill-nourished pigs.

SELECTION OF THE SIRE.

The choice of the sire is perhaps the most important step in all breeding operations. The trite remark that "the sire is half the herd" is only part of the truth. He is much more than half of the herd because, of the two parents, he usually exerts the greater influence on the conformation of the offspring. This, of course, is true only when he is the more intensely bred. It is not enough that he be pure-bred, it is important that he come of a line of ancestry, on both the male and the female side, that are remarkable for uniformity and individual merit. If he be the chance result

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of a line of indiscriminate breeding, he is not likely to prove an impressive sire. His stock can scarcely fail to be irregular in type. This point cannot well be over-emphasized, for it is just here that the novice in breeding is most apt to make mistakes. It is a too common practice to select and buy breeding stock from among the winners at our exhibitions, taking care only to stipulate that they be eligible for registration. Frequently a phenomenal show yard animal is an accident of birth, and, even though he be registered in the herd book, is none the less a "scrub" in point of breeding, and can reproduce his good qualities only by accident. It is unfortunately true that a certificate of registration is not always a certificate of merit. The only safe way to select breeding stock is to visit the long-established herd of some breeder of repute, and buy after seeing the sire and dam and, if possible, the grand-sire and grand-dam of the animal selected. Choose a boar from a large, even litter; fecundity is an hereditary trait and is essential to profitable hog raising, and the evenness of the litter is a valuable guaranty of the excellence of his breeding and of his consequent prepotency.

The offspring of immature parents should seldom or never be used for breeding purposes. They are apt to lack in constitution and vigour; this is especially the case in the offspring of an immature dam. Few things will more quickly and surely deteriorate a herd in size, vigour and fecundity than the continued use of immature females.

In conformation, the boar not only must be of the approved type for the breed, but must have distinct and unmistakable masculinity of appearance so easily recognized but not easily described. Masculinity does not necessarily imply undue coarseness; it consists rather in a bold, fearless "come on, who's afraid," expression of countenance than in any peculiarity of conformation. A certain amount of coarseness is unavoidable, especially in an aged boar; but he must not have such excessive roughness as would indicate poor feeding qualities. Nor is it desirable that he be of extreme size. Mr. Saunders Spencer, the noted English breeder, says on this point: "Although some persons make mere size a great point when choosing a boar, our experience leads us to consider this to be a mistake; a very large boar seldom lasts long; he becomes too heavy for the sows; he probably proves to be slow and his litters few and small in number. A very large and heavy boar is also more likely to suffer from weakness of the spine or hind quarters, and is frequently weak in his joints and crooked in his legs. These latter failings especially should be avoided, as they are hereditary, and will frequently crop up for several generations. Weakness of ankles and roundness of bone, two qualities which should be avoided in a sire, are often allied with great size. A medium-size, compact boar, heavy in the hind quarters, and light in the fore quarters will frequently continue fruitful for at least twice as long as will the heavy-shouldered and coarse boned-boar. Nearly all of the most successful pigs have been on a small rather than a large scale."

CARE OF BREEDING STOCK.

Breeding sows should not be closely confined summer or winter, but should be given the run of a pasture in summer and of a large yard in winter. If there is one mistake more common than another in the management of the breeding herd it is the failure to provide for and compel the hog to take sufficient exercise. The hog is by nature a grazing animal, and exercise is essential to his welfare. If the sows can be given the run of a pasture during the summer and of the stubble in autumn they will require little else to keep them in excellent breeding condition. They must, of course, have water and shelter; if they have access to a running stream in which they may wallow so much the better. A mud bath is nature's method of keeping a hog's skin healthy and free from vermin. Shelter is best provided by the use of a portable pen.

In winter they should have the run of the barnyard, a dry sheltered spot being provided for them to sleep in. A portable pen serves the purpose admirably. It is better not to be too warm so long as it is dry, free from drafts, well supplied with

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straw in which they may huddle. If their sleeping quarters are made too warm they chill too quickly on going out into the yard and they will not voluntarily take enough exercise.

They should be fed on nutritious but not too concentrated food. Mature, thrifty sows can be maintained in excellent breeding condition on a ration consisting largely of roots, preferably mangels or sugar beets. During a very cold snap some grain should be given to assist in maintaining the animal heat. As the sows become farther advanced in the period of gestation it is necessary to give more nourishment in less bulk, therefore the allowance of mangels should be gradually decreased and the complement of grain correspondingly increased as the season advances. The grain used should be of flesh-forming rather than of a fat or heat-producing character. Shorts or middlings is excellent, so is ground oats; barley or corn should be used sparingly, unless diluted with some form of dairy by-product. If fed alone these grains are too "heating" in their effect on the system. Sows wintered in this way should not be given thin sloppy food; the meal fed should have just enough water or milk poured over it to moisten it well. They will get enough water in the roots fed to supply all the requirements of the system; and to compel them to take water in excess of that amount, especially in cold weather, is to impose an unnecessary tax on the constitution. The energy required to warm up and throw off from the system a surplus of water, which some feeders compel their hogs to take in the form of thin sloppy food, is an unwarranted waste that not many can afford.

The objective point to be aimed at in the wintering of brood sows is to nourish and care for them in such a way that the spring litters will consist of good-sized, well-nourished, healthy, vigorous pigs, and that the sows themselves will be in such a condition of flesh as will carry them well over the trying period of nursing. To do this, the sows must have plenty of exercise, and must be fleshy but not fat. Sows carrying a load of soft, flabby fat put on in close pens will drop undersized and delicate pigs and they themselves will fail rapidly during the milking period. In addition to this, sows kept closely confined and fed largely on grain are apt to have their digestive systems so deranged as to develop abnormal appetites, and at farrowing time are as likely as not to devour a portion if not all of their offspring. On the contrary, experience has shown that the system of wintering previously recommended, in which the sows are given abundant exercise and fed on a nourishing but cooling succulent ration, has invariably been followed with the most satisfactory results.

A week or ten days before farrowing the sow should be placed in the breeding pen, in order that she may become reconciled to her new surroundings before the critical time arrives. It is also important that the attendant get on good terms with the sow; a few minutes spent on her every day with a stiff brush will be a good investment of time. This "currying favour" with the sow should not, of course, be a mere spasmodic effort at each farrowing period; it is the habitual practice of the thorough-going and successful stockman.

The Farrowing Pen.

The breeding pen should not be too large; about 8 feet square. If the pen is too large, there is danger in cold weather of the newly-farrowed pigs wandering away from the dam, getting lost and perishing from the cold. The pen should be warm and dry, and furnished with a fender to prevent the dam overlying her young. This consists of a plank or pole placed all around the sides of the pen about 10 inches from the wall and 9 inches from the floor. Very little bedding should be used, and this should be chaff or cut straw. If a large quantity of long straw is used the youngsters are apt to get tangled up in it and be overlaid by the sow.

An hour or so after farrowing the sow should be given a drink of warm water, into which not more than a handful or two of shorts or meal has been stirred. Very little grain should be given the first day; overfeeding with grain during the few days immediately before and after farrowing is apt to derange the digestive system and

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also cause trouble with the udder. The feed should be gradually increased until at the end of the first week she is getting all she will eat up clean. Nursing sows should be liberally fed on a ration well adapted to milk production. A sow nursing a large litter is subjected to a very severe strain, and if she be a good milker will fall away rapidly in flesh in spite of the most skilful feeding. This, however, is no reflection on the sow; for at no other period in the life of the pig is gain more economically obtained than while sucking its dam. Dairy by-products are especially valuable at this time, and of the grains, shorts or chopped oats are among the best. Barley and corn meal are too heating; the former tends to dry a sow off.

While some variety should be introduced into the sow's ration, extreme or radical changes must be avoided, as this is likely to cause digestive troubles in both dam and offspring.

The sow and her litter should be fed in a wide, flat-bottomed trough so large that when the food is put in it will cover the bottom not more than 1 inch deep. The young of most animals learn best by imitation, especially of the dam, and if a trough of this kind is used into which the pigs can climb they will quickly learn to eat, much more so than by the plan, so popular with some, of arranging a separate trough for them, from which the sow is excluded. After the young pigs have learned to eat well they may then be given access to separate feeding pens.

In cold weather, the food for the nursing sows should be given warm, and not too sloppy, water being supplied separately. It is also important that both sow and litter have frequent access to earth; it is easily possible to ruin the digestive system of a pig even before it is removed from the dam, and there is perhaps no better corrective for hogs than soil. In cold weather it must be furnished by artificial means. It is an excellent plan to lay up a supply in the fall for winter use, by piling up a few sods in some place where they will not freeze and can be readily obtained when wanted. These are better if taken from the woods, or some other location where the soil contains a large percentage of humus or decayed vegetable matter. Failing this, a pailful of earth from the root cellar twice a week will serve the purpose very well.

The litter should be weaned when 8 or 10 weeks old; by that time they should be eating so well at the trough that they will scarcely miss their dam when she is removed. The whole litter should be removed at once, letting them back to the sow once or twice if necessary, at intervals of not more than ten hours, to relieve her udder. It is quite a common practice to leave one or two pigs with the dam for a few days for this purpose. This is a mistake, because each pig will suck only the teat to which he has been accustomed, and will not touch the others, in this way defeating the object for which he was left with the dam.

Sometimes the milk teeth are abnormally long and sharp, causing them to irritate the sow's udder and lacerate the gums and tongue of the pig. They frequently become discoloured from digestive troubles, and are then known as "black teeth." They should be removed with a pair of pincers as soon as noticed. Many breeders make it a practice to remove them from the whole litter when two or three days old; and, although not always necessary, this is perhaps the better plan.

The Boar.

Assuming that the pig has been purchased shortly after weaning, he should be placed in a dry, clean, roomy pen with access at will to a paddock. It is well to give him a barrow of about his own age for company; feed liberally on food calculated to form bone and muscle, but do not force him too rapidly; care must be taken to avoid getting him too fat. No better food can be given than the by-products of the dairy with middlings or ground oats, supplemented with plenty of succulent food in the form of grass or roots. Let him root in the paddock; it is the best exercise he can take, calling into active play every muscle in the body, and, besides, it furnishes him with amusement and occupation. Curry and brush him frequently; it not only keeps his skin and hair healthy and active, but tends to make him quiet and gentle. The tusks should be removed as soon as well formed.

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REARING AND FINISHING.

Care is necessary at weaning time to get the pigs safely over this crisis in their lives and well started without any serious setback. Many breeders sacrifice the profit from a batch of pigs because of lack of skill or care in weaning. More pigs are lost or irretrievably ruined when they are first weaned than at any other time in their existence. A stunted animal of any kind is always unprofitable, and this is doubly true of a pig. With him especially, life is too short to recover losses due to mistakes that might have been avoided.

Among the errors into which one is most liable to fall at this time is that of feeding a strong grain ration to compensate for the loss of the mother's milk. The pigs, if well managed, should be eating so freely at the trough as nearly to wean themselves, and no change should be made in the ration unless it be to add a little skim milk. Even this had better be done some time before the removal of the sow. The loss of the dam's milk, small though it may have become in quantity, is change enough at one time.

Another mistake is that of overfeeding. Before the removal of the sow, just as much food should be given as she and the litter will clean up at each feeding; when the sow is taken away, the feeder, either from mistaken kindness to the pigs or from a failure properly to estimate their requirements, may overfeed to such an extent that food often lies in the trough from one feeding to another. This is a mistake for two reasons: the weanlings, missing their dam, are tempted to overtax their digestive systems; and the portion of the food remaining in the trough is apt to become foul as a result of fermentation and other causes. In either case digestive troubles will inevitably follow; and these, if not fatal to the pig, are disastrous to the owner's chance of profit. While the other extreme also must be avoided, it is better for a while at least to err a little on the side of underfeeding than to over feed. Ideal conditions would be to feed at frequent regular intervals as much as they will eat up clean in a few minutes after feeding. It is not often possible to make our practice conform wholly to the ideal, but the nearer we can approach to it the better will be our success.

A mixture of middlings and chopped oats, supplemented with a little skim milk, constitutes an excellent ration for weanling pigs. It is rich in ash and protein for the nourishment of the growing bones and muscles, thus enabling the pig to build up framework rather than to lay on fat. It not only furnishes the right kind of nourishment for a growing pig, but supplies it in a palatable and easily-digested form. For pigs under 12 weeks the oat chop should be passed over a coarse screen, to remove most of the hulls. If this be done, it may be well to add as much bran in bulk as was removed in oat hulls. The bran is more palatable and more easily digested than the oat hulls, and it lightens up the ration, preventing the meal from lying in too close and solid a mass in the stomach. The addition of the bran, however, will depend on the quality of the middlings used, and it devolves upon each individual feeder to exercise his personal judgment in this matter. The nature of the material sold as middlings by different mills varies from coarse, dark-coloured flour to finely-ground bran. The feed stuff the writer has in mind, when speaking of middlings, would consist of about an even mixture of these two materials.

Roots or some other kind of green food, either in the form of pasture or a soiling crop cut and fed in the pen, should be gradually introduced until they constitute about one-half of the ration by the time the pig is 3 months old. Many practical feeders are firm in the belief that, in summer, pigs can be most cheaply raised on pasture supplemented with a light grain ration. There is much to be said in favour

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of the practice, especially since the labour question has become so acute. The hogs, having unrestricted access to earth, and taking plenty of exercise, are vigorous and healthy; there is never any trouble with paralysis or with pigs going "off their feed"; and with good fences a large herd can be carried in this way with a minimum of attention, interfering little or not at all with the ordinary operations of the farm.

PASTURING AND SOILING.

Experiments conducted by Prof. Day at Guelph to test the relative economy of pasturing and soiling pigs seem to indicate that cheaper gains are obtained by soiling. In this experiment thirty-four pigs were fed. Eighteen of these were fed in pens with access to an outside yard, and sixteen were turned into a pasture of ordinary tares until August 6, when they were turned into rape pasture. Both outside and inside hogs were fed twice a day what meal they would eat readily. The meal was fed dry, and consists of two parts barley to one part middling by weight. The inside hogs were fed, in addition to the meal, all the green food they would eat, receiving tares until August 6 and rape after that date; exactly the same forage as that on which the other lot were pasturing. The experiment was commenced on July 6, and on October 14 all of the inside pigs and some of the outside pigs were ready for shipment. Seven Berkshires and three Yorkshires of the outside bunch were still unfinished and had to be carried over until November 12, when they, too, were shipped to the slaughter house.

The meal consumed per 100 pounds gain was as follows: Group on pasture, 525 pounds; group fed in the pens, 395 pounds.

The packing house reported on the pigs as follows: "The last shipment of hogs which you sent to us is just out of salt, and we have to report to you that all the sides without exception show a very satisfactory degree of firmness. Our bacon inspector's report is that all the sides grade No. 1 in respect of hardness, and my own judgment of the sides, going over them trying to find differences that might be of some value to you, was that there was practically no difference between the different sides, either in the groups themselves, which you designated by A and B, or in contrasting the two groups. Whatever your method of feeding has been in regard to these particular hogs, you certainly have discovered some system that gives you excellent results."

Prof. Day sums up the experiments as follows:—

1. In this experiment feeding hogs on pasture proved a very expensive method, whereas feeding in pens with same kinds of food gave reasonably economical gains.

2. The outside hogs ate more meal and made slower gains than those fed inside.

3. All the hogs produced bacon of satisfactory firmness. This confirms the result of a previous experiment with rape, and goes to show that a reasonable supply of green feed with a liberal meal ration produces a good quality of bacon.

4. Succulent food tends to keep animals thrifty, whether it be green food or roots, and thriftiness is conducive to firmness in the bacon produced.

5. The inside hogs consumed, on an average, nearly 4 pounds of green food each per day, together with 4⅓ pounds of meal.

6. As this proportion of green feed to meal is practically the same as the proportion of roots to meal which we have used with good results, it seems safe to assume that the use of equal weights of succulent food and meal tends to produce bacon of firm quality.

7. The time required to attend to the outside hogs was just about half of that required for those inside.

It must not be forgotten that the pigs fed in the pens had the run of a small paddock in which they took exercise at will, and had unrestricted access to the clay. Where these conditions do not obtain so good results cannot be had from soiling. It must also be remembered that, although greater gains may be obtained from a given amount of food consumed, there is a considerable item for labour to be included in

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the cost of pork produced in this way. Whether or not it will pay to pasture hogs in summer, or to cut green forage and cart it to them in the pens, will depend largely on the facilities one has at his disposal, especially in the matter of labour.

Probably rape is the most valuable crop for this purpose or for pasturing. It grows rapidly and may be sown at successive intervals so as to furnish a continuous supply from the first of June until the frost; it furnishes a large supply of food from a given area; although hogs do not take to it readily at first they soon acquire a taste for it and eat it freely.

For hogs, rape should be sown somewhat thickly in rows about 24 to 28 inches apart. Three pounds of seed per acre will give a very good stand, if the seed is of good quality. If the rape is too thin it grows somewhat coarse in texture and the pigs do not eat it so readily.

Another valuable green crop for hogs is alfalfa. Pigs are fond of it and will make very satisfactory gains if it is fed with discretion. It should be fed before it blossoms or it becomes too woody; and is not only less palatable, but also less digestible. Common red clover is also excellent; peas, vetches, almost any succulent forage crop may be used with advantage.

For winter feeding the succulent portion of the ration can be most cheaply and satisfactorily furnished in the form of roots, preferably mangels or sugar beets.

It has been pretty well established that hogs cannot be fed to the best advantage on an exclusive grain diet, especially during the growing period. The result of heavy grain feeding is to check growth, and to cause the pig to lay on flesh and become too thick and fat before the desired weight has been attained.

He is the most successful feeder who maintains his pigs on a cheap, bulky, easily-digested ration, rich in bone and muscle forming elements, until they reach a weight of from 130 to 150 pounds, then finishes on a stronger ration until they are in prime condition, but not too fat, and weigh from 180 to 220 pounds.

THE COST OF RAISING SWINE.

The question of ascertaining the cost of raising hogs from birth to marketing has been subjected to much more controversy than experimentation. So few swine raisers find time to keep an accurate account of the quantities of feed used by their hogs from day to day the question of gaining information on this point is left largely to experiment stations. Valuable data have been secured, through the co-operation of Prof. Day, of the Ontario Agricultural College, upon the average cost of raising hogs to bacon weights upon Ontario farms. The work was undertaken at the suggestion of one of the leading bacon-curing firms in Canada, who encouraged it by offering to pay for finished hogs 50 cents per hundredweight above the market price when the pigs were marketed, to those who would render a full report upon the food consumed by the hogs from the time of weaning until shipped to market, and upon certain ther points necessary to an intelligent study of the question. No restrictions whatever were placed upon the feeders regarding the kinds of food used or the methods of feeding to be followed, these being let entirely to the discretion of the farmers to whose interests it would be to feed in the manner found by each in his experience to yield the greatest profit upon his own farm. In all, ten reports were received, each accompanied by a declaration of accuracy signed by the experimenter.

The feeding, in each case, was done under normal farm conditions, in not less than seven counties spread over a large part of the province.

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The following table gives the number and breed of swine in each lot, the food consumed, age and weight when sold, and the cost per 100 pounds when grain is worth $23 per ton: —

Lot.	No. of pigs.	How bred.	Age when sold.	Weight when sold.	Food Consumed.	Cost per cwt. on food at $23 per ton.
			Days.	Lb.		$ c.
No. 1.		Yorkshire boar, grade Tamworth and Chester White sow	217	1800	Barley, 3552 lb.; shorts, 905 lb.; mangels, 740 lb.; green clover, 285 lb.; skim milk, 1620 lb.	3 93
No. 2.	12	Yorkshire	224	2425	Barley, 5374 lb.; shorts, 1169 lb.; mangels, 815 lb.; green clover, 390 lb.; skim milk, 2160 lb.	4 17
No. 3.	12	Yorkshire	247	2360	Meal, (barely, oats, peas and shorts), 7333 lb; mangels, 545 lb.; skim milk, 2520 lb.	4 52
No. 4.	10	Yorkshire	238	2050	Meal, (barley, peas and oats), 517 lb.; shorts, 1038 lb.; mangels, 3200 lb.; milk, 2650 lb.	4 52
No. 5.	7	Berkshire boar, Yorkshire sow.	233	1525	Barley, 1960 lb.; wheat, 1300 lb.; oats, 800 lb.; mangels, 6000 lb.; skim milk, 8800 lb.	4 97
No. 6.	10	Yorkshire boar, Tamworth sow	177	2060	Meal, (barley, oats, wheat and peas), 4215 lb.; shorts, 816 lb.; whey, 1500 lb.; miscellaneous foods, valued at $5	4 07
No. 7.	14	Yorkshire	213	2740	Barley, 1243 lb.; shorts, 4,600 lb.; corn, 1585 lb.; milk, 9330 lb.; small potatoes (3 bags) and pasture valued at $5.90	4 61
No. 8.	7	Yorkshire grades	194	1300	Meal, (barley and oats) 2230 lb.; shorts, 274 lb.; milk, 3960 lb.; pasture and green feed, $5	3 86
No. 9.	11	Berkshire boar, grade Yorkshire sow.	179	2740	Meal, (barley and peas), 10,016 lb.; mangels, 3300 lb.; milk, 4020 lb.	5 31
No. 10.	8	Tamworth boar, grade Yorkshire and Tamworth sow	200	1740	Barley, 3115 lb.; shorts, 390 lb.; mangels, 600 lb.; milk, 1200 lb; 51 days on stubble without other food	3 14

In order to arrive at a uniform basis of calculation, the cost of the pigs up to weaning time was placed at $1.50 each. This is 23 cents higher per head than weanlings from a large number of sows cost at the Ontario Agricultural College when due consideration was made for the food consumed by the sows during their idle period.

The grain foods were valued at $23 per ton, and included bran, shorts and chopped coarse grain. The values placed on supplementary foods were as follows: Skim milk and buttermilk, 15 cents per hundredweight; whey, 4 cents per hundredweight; roots and other green foods, $2 per ton. The values for pasture and miscellaneous foods appear in the table and represent about the values placed on these by the experimenters.

Attention may be called to the uniformity of cost, excepting lot 10, although the feeding was done under the variable conditions of breeds and grades of swine and of methods of feeding found in different parts of the province.

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In the case of lot 10 the hogs gathered their food from August 1 to September 20 on a stubble field of mixed oats and barley on which the crop had lodged badly, leaving much shelled grain on the ground. Since the food gathered by the hogs would have been otherwise lost, no value was placed upon it. This group is not included in the general average, but it is inserted in the table as an example of how live stock can frequently make profitable use of what would otherwise be wasted.

COST OF GAIN AT DIFFERENT STAGES OF GROWTH.

As pigs increase in weight, the amount of feed eaten daily increases rapidly; the daily gain increases also, but not in the same ratio; so that the amount of feed consumed per 100 pounds of gain increases with the weight of the pigs. This is well illustrated by an experiment by Prof. G. E. Day at Guelph testing a number of pure breeds of swine. In reporting this experiment Prof. Day says:—

"In the experiments with pure-bred hogs a rather interesting point was brought out incidentally. It has been shown by other experiment stations that the cost of producing a pound of gain in hogs increases as the animals become heavier. As our pure-bred hogs were weighed at regular intervals and as every pound of meal they consumed was carefully weighed, an opportunity was afforded to test further the truth of the claim, and a statement of the results is given below. These results are computed from the gains made and the food consumed by thirty-six hogs, so that they afford very conclusive evidence. In computing the average weights of the hogs, fractions of pounds were omitted, the nearest whole number of pounds being taken in each case."

The following is a statement of food consumed for one pound of gain by hogs of different weights:—

"While increasing in live weight from 54 pounds to 82 pounds, hogs required 3·10 pounds meal per pound of gain.

"While increasing in live weight from 82 pounds to 115 pounds, hogs required 3·75 pounds meal per pound of gain.

"While increasing in live weight from 115 pounds to 148 pounds, hogs required 4·38 pounds meal per pound of gain.

"While increasing in live weight from 148 pounds to 170 pounds, hogs required 4·55 pounds meal per pound of gain.

"This statement shows that there is a steady increase in the amount of meal required to produce a pound of gain as the hogs increase in weight, and is a strong argument in favour of marketing hogs by the time, or a little before, they reach 200 pounds in weight."

Prof. Henry, in his book, "Feeds and Feeding," gives the following data, which are especially valuable and reliable by reason of the large number of animals fed and reported on. The last column will be found especially interesting to the practical feeder. The food used is valued at $1 per hundredweight.

Weight of pigs in lb.	Actual average Weight.	Number of stations reporting.	Total number of trials.	Total number of animals fed.	Average feed eaten per day.	Feed eaten daily per 100 lb. live weight.	Average gain per day.	Feed for 100 lb. gain.	Cost per 100 lb. gain.
	Lb.				Lb.	Lb.	Lb.	Lb.	$ cts.
15 to 50	38	9	41	174	2·23	5·95	·76	293	2 93
50 to 100	78	13	100	417	3·35	4·32	·83	400	4 00
100 to 150	128	13	119	495	4·79	3·75	1·10	437	4 37
150 to 200	174	11	107	489	5·91	3·43	1·24	482	4 82
200 to 250	226	12	72	300	6·57	2·91	1·33	498	4 98
250 to 300	271	8	46	223	7·40	2·74	1·46	511	5 11
300 to 350	320	3	19	105	7·50	2·35	1·40	535	5 35

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CONDIMENTS OR CORRECTIVES.

Hogs that are closely confined and highly fed require a corrective of some kind to maintain the digestive system in a normal condition of health, and the fatter the pig the greater the necessity. When a hog is running at large, he does not root up the pasture from pure love of exercise; he roots to obtain something for which his system craves. It is the craving that causes a confined pig to gnaw and tear at the trough and the sides of the pen. The cause of this unnatural craving is not well understood. It may be due in part to a lack of ash in the food; or, as has already been stated, a hog may be getting all the grain he can eat and yet be partially starved, because certain requirements of the system are insufficiently supplied. It has been attributed by some to the presence of intestinal worms; and by others to some form of indigestion. Whatever may be the part played in the animal economy by those substances, one thing is clear, that when they are supplied, hogs are heartier, eat better, thrive better, and consequently pay better.

Charcoal is probably one of the best correctives; and when it can be readily obtained it will pay to keep a supply in some place where the hogs can get at it whenever they wish. The following preparation is an excellent tonic:—

"Take 6 bushels of corncob charcoal, or 3 bushels of common charcoal; 8 pounds of salt; 2 quarts of air-slaked lime; 1 bushel of wood ashes. Break the charcoal well down with a shovel or other implement and thoroughly mix; then take 1½ pounds of copperas and dissolve it in hot water. With an ordinary watering pot sprinkle this over the whole mass and then again mix thoroughly. Put this mixture into the self-feeding boxes, and place where hogs of all ages can eat of the contents at pleasure."

The charcoal furnishes the required mineral matter which may have been lacking in the food, and is also an excellent corrective for digestive troubles, while the copperas is a valuable tonic and stomachic.

If the charcoal is hard to get, its place is taken almost as well by sods of earth rich in humus. It is questionable, indeed, if there is anything better than sods or vegetable mould taken from the wood lot. If a small quantity be thrown in each pen daily, it is astonishing to see how much of it the hogs will consume; and the improved health and thrift of the animals will be a revelation to the feeder who has never before tried it. Ground bone, wood ashes, soft coal, old mortar, rotten wood, etc., are also among the substances used and recommended for this purpose.

FOODS.

The extraordinary thrift of pigs of all ages was a matter of constant surprise to the members of the swine commission that visited Denmark a few years ago. This was the more pronounced because Danish pigs are almost constantly housed. It was accounted for by the feeding of milk and the generous use made of green foods in the daily ration of the animals. Clover, alfalfa, green cereals and roots were everywhere used according to the season of the year.

The value of green fodder, as well as cured clover and alfalfa for feeding hogs is well understood in this country. Experimenters and successful feeders on the ordinary farm have reached the same conclusion that these coarser foods have a feeding value when fed with heavy grains far in excess of their actual nutrients. The hog is a grazing animal and is therefore able to digest a fair quantity of fibrous material which has a salutary effect on the digestive organs. The Danes cut green foods into short lengths and mix them with grain slops. In this country pasturing and feeding whole on the floor or in racks are the more usual methods. Roots are given whole or pulped, and an occasional feeder cooks his turnips or mangels, but practically all feeders use them in one or other form up to the finishing period unless whey, skim milk or buttermilk are available in generous quantities.

At the Central Experimental Farm the value of roots for feeding swine was arrived at by comparing them with clover and alfalfa pasture. The roots consisted of

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mangels, sugar beets and carrots, and were pastured by the pigs. In another test, the roots were given to the pigs in pens. Fed in pens on roots the cost per 100 pounds of gain was $4.23. When meal was added to the roots in the pens, the cost was $3.09 per 100 pounds, and when meal was fed to pigs on root pasture the cost was $3.82 per 100 pounds. On alfalfa pasture the cost of gains was $3.67, and on red clover pasture, $3.53 per 100 pounds of gain. The cheapest gains were therefore made when feeding roots and meal in close quarters. Growing pigs to be kept for breeding are better for having an outside run, but for fattening, close quarters give the best results when the feeding is such as to maintain good health and thrift. A comparison of mangels with sugar beets showed that with the former, the cost was $6.20, and with the latter $5.05 per 100 pounds of gain by pigs eating these foods.

Clover (Common Red).

The value of common red clover either as a pasture or as a part of the winter ration for growing pigs is well known. Stewart, in his admirable work, "Feeding Animals," reports an experiment in which he fed pigs averaging 75 pounds each with corn meal, 2 quarts of short-cut clover being added to each day's allowance, and the whole wet with hot water, and allowed to stand from ten to twelve hours before feeding. Another lot received meal prepared in the same way, but without the clover mixture. The lot getting clover hay showed the best appetite, the greatest thrift, and made the steadiest gains. The pigs getting meal alone gained 110 pounds each in 120 days, while those having the cut clover hay mixed with their meal gained 143 pounds each, or 30 per cent more.

At the Central Experimental Farm it was found that steamed clover makes a very satisfactory substitute for milk, as an addition to a grain ration for growing pigs.

Alfalfa.

Alfalfa seems to be even more acceptable to pigs than the red clover. In a pasture in which the two clovers are mixed, the pigs will eat the alfalfa bare to the ground before touching the other. It is important, therefore, that an alfalfa pasture be not overstocked, as this plant will not stand close cropping.

At the Kansas station, alfalfa hay has been found a very profitable addition to the winter ration for fattening hogs. The hay used was of first-class quality, and was fed whole, as an adjunct to corn. It was given freely so that the pigs ate only the leaves and finer portions, rejecting the coarser stems, which, although charged against the hogs, were used as bedding. It was found that the hogs getting alfalfa hay in addition to their grain, consumed more feed but made much more rapid and economical gains. The hogs receiving alfalfa hay in addition to corn made an average gain of 90·9 pounds in 9 weeks, while those getting corn alone gained only 52·4 pounds. The gains per bushel of feed were as follows:—

One bushel corn and 7·83 pounds alfalfa hay produced..	10·88 pounds gain.
One bushel corn alone produced..	7·48 "

At the Utah station alfalfa hay was fed in addition to a full grain ration of chopped wheat and bran, and the hogs thus fed consumed more grain and made much larger and more economical gains than those fed on grain alone.

These and other results indicate that alfalfa has a feeding value in addition to the actual nutrients contained. It stimulates the appetite, aids digestion, and improves the general health and thrift of the animal. The most profitable results at all stations were obtained by feeding all the grain the pigs would eat in addition to the alfalfa. Larger gains for a given quantity of feed consumed were obtained by feeding a limited grain ration and compelling the pigs to eat more of the alfalfa, but much more rapid gains and better general thrift of the pigs getting a full grain ration in addition to the alfalfa was found to yield a large net profit, and to be more satisfactory in every way.

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The alfalfa was fed dry, either whole or cut into chaff, and separate from the meal. Better results are obtained in this way than by mixing with the meal and thus forcing the pigs to consume an undue amount of it.

Rape.

All things considered, rape is perhaps the most valuable crop for summer roughage. Hogs soon become very fond of it, and if the rape is supplemented with a liberal grain ration, they will make very cheap and satisfactory gains. Like all other bulky forage crops its only value is as a supplement to a grain ration; hogs will not make satisfactory gains on rape pasture alone. In experiments at Ottawa and at Guelph, rape has proved itself not only to be economical, but also to be conducive to the production of bacon of the highest quality.

Roots.

Prof. Day, of the Ontario Agricultural College, conducted an experiment to determine the value of roots when fed in conjunction with a grain ration. Four groups of pigs were fed as follows:—

Groups.	Total Weight, Oct. 23.	Total Weight, May 7.	Average daily gain per hog.
	Lb.	Lb.	Lb.
Experiment A—			
Group I—5 hogs; barley and middlings	169	670	·639
Group II—4 hogs; barley, middlings and roots	163	840	·857
Experiment B—			
Group III—5 hogs; corn and middlings	276	940	·677
Group IV—5 hogs; corn, middlings and roots	276	1,020	·757

In experiment A, 319 pounds, and in experiment B, 534 pounds of roots effected a saving of 100 pounds meal. These are abnormally high values for roots, but the experiment illustrated very well the value of roots when fed in limited quantities. In this experiment the groups getting roots were fed equal parts by weight of roots and grains. It was found that the hogs getting roots made large daily gains, and that the tendency was to growth rather than to fatten. It was necessary at the close of the experiment to reduce the amount of roots in order to get the pigs fat enough. The pigs receiving roots not only made larger and more economical gains, but also produced a finer quality of bacon than the groups fed grain alone.

Of the various root crops, mangels and sugar beets seem to be better adapted to swine feeding than turnips. They are more palatable, and the pigs seem to relish them better and eat them more readily. Sugar beets have an additional advantage in that they are better keepers than either mangels or turnips, and will thus furnish a supply of succulent food during the month of May and the early part of June, when not much else is available.

Potatoes.

Potatoes should in all cases be cooked for pigs. If fed raw they are very hard to digest and of comparatively small feeding value. The water in which they are boiled should be poured off, as it contains substances prejudicial to health. The feeding

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value of potatoes consists almost wholly in the large amount of starch that they contain. They are therefore an extremely one-sided food, and should be supplemented with some food stuff rich in muscle formers. For this purpose nothing is better than pea meal and if some skim milk or buttermilk can be added to the ration, very satisfactory results will be obtained.

The Danes found 400 pounds of potatoes cooked and fed with skim milk equal to 100 pounds of grain fed with a similar quantity of skim milk, and found that the quality of the pork produced from potatoes and skim milk was excellent.

Dairy By-products.

So valuable are the by-products of the dairy, viz., skim milk, buttermilk and whey, that they are regarded by many farmers as indispensable in the rearing of young pigs, and it must be acknowledged that, although many feeders are rearing hogs profitably without these foods, much better and cheaper results are possible when a limited amount of milk can be added to the ration. This is especially true in the case of pigs only recently weaned. Milk, being rich in ash and protein, is peculiarly adapted to the building up of the muscles and bony framework of growing animals.

Better results are obtained from skim milk or buttermilk when fed in conjunction with some cereal rich in starch, such as corn or barley, than when fed with other meals too rich in protein, such as gluten meal or pea meal. It has been found that milk is most valuable when fed in small quantities, viz., from 3 to 6 pounds of milk for each pound of grain fed.

When feeding 2 pounds of milk per head per day, 163 pounds of milk effected a saving of 100 pounds grain.

When feeding 3 pounds milk per head per day, 323 pounds of milk effected a saving of 100 pounds grain.

When feeding 5·4 pounds milk per head per day, 533 pounds milk effected a saving of 100 pounds grain.

When feeding 15·7 pounds milk per head per day, 734 pounds milk effected a saving of 100 pounds grain.

When feeding 17·1 pounds milk per head per day, 882 pounds milk effected a saving of 100 pounds grain.

As a result of a very exhaustive experiment conducted at the Wisnonsin station it was found that:—

When feeding 1 pound corn meal with from 1 to 3 pounds separator skim milk, 327 pounds skim milk saves 100 pounds meal.

When feeding 1 pound corn meal with from 3 to 5 pounds separator skim milk, 446 pounds skim milk saves 100 pounds meal.

When feeding 1 pound corn meal with from 5 to 7 pounds separator skim milk, 572 pounds skim milk saves 100 pounds meal.

When feeding 1 pound corn meal with from 7 to 9 pounds separator skim milk, 823 pounds skim milk saves 100 pounds meal.

Average of all, 542 pounds skim milk equals 100 pounds meal.

When mixed grains are worth $1 per hundredweight, skim milk fed at the following quantities per day is worth as follows per hundredweight:—

2	pounds	per day—54	cents per cwt.
3	"	—31	"
5·4	"	—18·6	"
15·7	"	—13·6	"
17·1	"	—11·33	"

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These results are corroborated by the findings of the Cornell, and also of the Utah station. Danish investigators also found that the relative gain obtained from milk increased as the quantity fed was decreased. As a result of their experiments they conclude that under ordinary circumstances 600 pounds of milk may be considered equivalent to 100 pounds of rye or barley meal.

Buttermilk has a very similar feeding value to skim milk, varying of course with the amount of water added.

Whey also has a very high feeding value when fed in conjunction with a liberal grain ration. Prof. Day found that when feeding about 2 pounds of whey to 1 pound of grain, from 750 to 800 pounds of whey effected a saving of 100 pounds of grain. Very similar results were obtained at Wisconsin.

THE SYSTEM OF FEEDING IN DENMARK.

Pigs fed at the experiment stations in Denmark are weaned at from six to eight weeks of age and are at once delivered to the station. At the station pigs are divided into four groups according to weight. Class I includes pigs up to 40 pounds; class 2, 40 to 60 pounds; class 3, 60 to 120 pounds; and class 4, 120 pounds to about 200 pounds when they are finished. All foods are calculated in 'food units,' using one pound of grain, such as barley, corn, wheat, etc., as a basis. In roots and other green feed the food units are estimated on their dry matter, as, for example, 8 pounds of mangels, 4 pounds of boiled potatoes, 5 pounds of lucerne or 5 pounds of sugar beets, equal one food unit. In the case of milk 6 pounds and of whey 12 pounds are calculated to have a feeding value of one food unit. In other words the feeding value of 1 pound of grain (barley, corn, wheat, shorts, etc.) has the same feeding value as 6 pounds of milk, 8 pounds of mangels, 4 pounds of boiled potatoes, 5 pounds of sugar beets or 5 pounds of green lucerne, or green vetches.

The diet is varied according to the classes of pigs. In class 1 the ration consists of 30 per cent milk and 70 per cent grain, calculated in food units. In other words, the mixture fed consists of 180 parts (6 x 30=180) by weight of milk to 70 parts by weight of meal.

In food units class 2 gets 25 per cent milk, 70 per cent grain and 5 per cent roots or green fodder. The mixture fed at this stage consists, therefrom, of 150 parts (6 x 25=150) by weight of milk, 70 parts by weight of grain and 40 parts (5 x 8=40) by weight of mangels. If lucerne or vetches were fed instead of roots this part of the mixture would be 25 parts by weight of the mixture, and corresponding weights in the case of sugar beets, boiled potatoes, etc.

Class 3 gets 15 per cent milk, 75 per cent grain and 10 per cent roots, or green fodder. This ration consists of a mixture of 90 parts by weight of milk, 75 parts by weight of grain and 80 parts by weight of mangels, etc.

Class 4—each pig gets three-quarters of one food unit (4½ lbs.) of milk, one-quarter of one food unit (2 lbs.) of roots, if mangels, or 1½ pounds of sugar beets or lucerne, and the remainder in the form of grain.

The food is given in the form of a slop, rather thin, while the pigs are young and thicker towards the end. The food is prepared one day ahead. At a station visited in July the grain mixture consisted of about equal parts of barley, corn, oats and shorts. The feeding was done three times daily, and while the appetite was satisfied at each meal the trough was always cleaned up by the time the meal was over. It was evident that the feeding was intelligently done. Young pigs up to 60 pounds of weight get charcoal, and when necessary to regulate the bowels, a little cod liver oil.

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PORK PRODUCTION ON CANADIAN FARMS.

While swine are raised in Canada under practically all conditions of farming, as an industry of any magnitude it is carried on under three principal conditions. Following supplies of hogs from market centres back to the sources of production, one reaches the patrons of cheese factories or creameries, or those that make meat rather than milk the object of chief effort. An investigation of the subject has shown clearly that pork can be and is very profitably produced under any of the three conditions mentioned.

Believing that experience gained from actual practice is most valuable, a tour of investigation was made into a number of hog-raising sections. In each of these the farms of the most persistent and successful hog raisers were visited. In almost every case the hog was regarded as almost necessary to profit in farming. The ease with which he is raised, the cheapness of his housing and the rapidity of returns were all

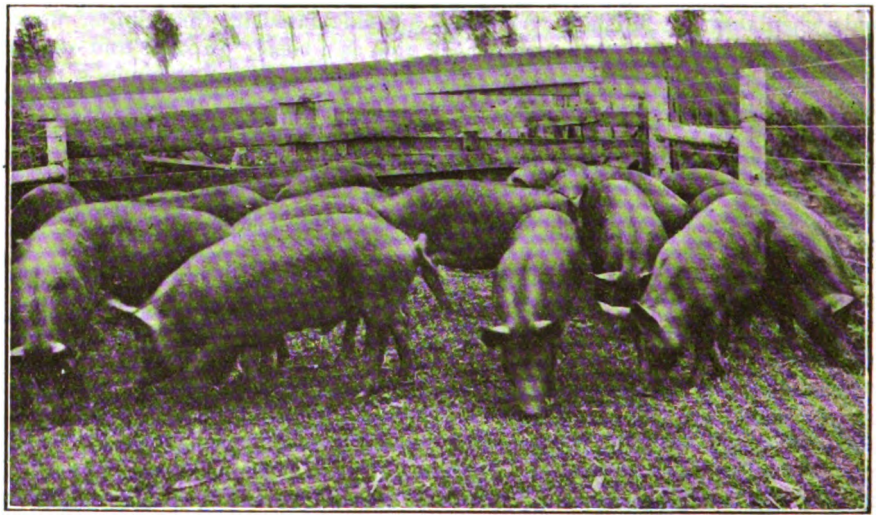

Fig. 21.—Hogs of good type on a Canadian farm.

appreciated by those who are able to turn off shipments from time to time throughout the year. A common difficulty experienced and lamented, was the scarcity of efficient help, without which valuable food may very easily be wasted because unless a hog is gaining according to the food he consumes, he is being fed at a loss. Were it not for the dearth of intelligent, experienced help available at a moderate rate of wages, there would be less complaint from packers regarding supplies until at least the price paid for good stock is materially reduced.

WHEY IN PORK PRODUCTION.

The counties of Perth, Waterloo, Oxford and Lanark in Ontario, are recognized as productive sources of whey-fed hogs. In the county of Perth many hogs are fed at cheese factories. One firm has carried this on continuously for forty-five years. The number of pigs fed is about equal to the number of cows milked by the patrons. In 1913, 912 hogs were finished on the whey (with other food) from the milk of 900 cows. The hogs are purchased, as a rule, weighing about 100 pounds each and are

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finished at about 220 pounds. Early in the season younger pigs are bought. These are turned on grass pasture and fed whey with a very light grain ration until they reach about 100 pounds weight. They are then put in the pens with the others and kept there until finished.

Whey forms the principal food and is fed sweet and warm. One gallon per hog three times a day is fed in the beginning, and is, after a few weeks, increased gradually until two gallons is reached, but never exceeded. Each pen holds nine hogs. This number received one gallon of mixed chop three times daily. This ration is maintained for about two months and then gradually increased to two gallons, which is continued until the hogs are finished.

If the hogs seem not to be doing well they are given a supply of sods which usually corrects any lack of thrift. Should the hogs begin to cough, each pen is given a teaspoonful of spirits of turpentine in the food once in three weeks.

The grain mixture consists of two parts coarse shorts, one part wheat or corn (the latter preferred) ground fine, and one-half part low-grade flour. This is a standard ration and is departed from when the market can supply substitutes more profitably. The mixture is placed in the troughs dry, and ten or fifteen minutes afterwards whey is poured in. During the cheesemaking season of 1913 the 912 hogs fed gained 86,310 pounds on 118 tons of grain food in addition to the whey from 900 cows. The work of feeding and caring for the hogs was done by one experienced man.

Feeding on Farms.

A number of cheese factory patrons who feed the whey from their milk were visited. Farmer No. 1 farms 100 acres, milks twelve cows, keeps 4 Yorkshire brood sows that produce two litters per year. The sows are fed whey when available in pasture until within one week of farrowing, and are fed heavily only when suckling. Litters are weaned at 7 weeks old. The weanlings get finely-ground oat chop with whey or skim-milk fed as a slop. After the pigs are 3 months old they are given mangels whole, once daily, and slop twice until they weigh 150 pounds. They are then fed more heavily on whey, corn and oat chop, and finished at 6½ to 7 months old, weighing about 225 pounds. In summer, green food, as clover, alfalfa, etc., is substituted for the mangels in winter.

Farmer No. 2 keeps fourteen cows on 127 acres. He gets two litters per year from nine sows, Berkshire and Tamworth. All, except about thirty young pigs of each crop, are sold as stockers. The aim is to finish the pigs for the spring trade or for July and August. The sows get mangels or grass and whey when dry, and oat chop and whey when milking. The litters are weaned at 6 weeks old and thereafter get fine oat chop and sweet whey or skim milk. They graze until they weigh 100 pounds and are then housed and fed heavily until finished. The finishing ration consists largely of corn and barley chop and whey. In winter, skim milk and water is substituted for whey. A supply of charcoal and ashes is given once or twice a week.

Farmer No. 3 farms 220 acres, on which he keeps twenty cows and from nine to twelve sows. Two litters per year are raised. These are weaned at 7 weeks old, and fed thereafter on whey or milk with a mixture consisting of four parts oats, one part barley, one part corn ground fine and mixed with an equal quantity, by bulk, of bran. This mixture is allowed to soak twelve hours in the liquid and is fed as a slop of moderate thickness. As the pigs grow the ration is made stronger, until during the final period of about one month the grain ration consists of crushed corn and barley. The milking sows get oats and bran with liquid. In summer, green food and in winter mangels are fed at noon. Slop is fed three times daily. The hogs are marketed at about 7 months old, weighing, as a rule, about 225 pounds. The feeding hogs are housed most of the time, and get sods and charcoal occasionally.

Farmer No. 4 feeds, during the summer, the whey from 60,000 pounds of milk produced by seventeen cows. He keeps three brood sows of Berkshire, Tamworth and

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Yorkshire breeding, from which he raises three litters per year. The sows when milking are fed chiefly shorts along with whey when available. Litters are weaned at 7 weeks old, and get, in addition to the shorts and whey, a few pulped mangels or other green food. In cold weather the roots are boiled, mixed with chop and fed warm. The hogs are housed continuously, and as finishing approaches the grain ration consists of barley chop and low-grade flour. They are usually sold at 8½ months old, weighing about 220 pounds.

Farmer No. 5 feeds the whey from twenty-five cows kept on 150 acres. He usually keeps from six to eight sows, from which he raises two litters a year. Spring litters are turned out of doors when 10 days old, and receive, with their mothers, slop made of shorts and whey. Mangels are preferred for hogs of all ages when not on pasture. The mangels are pulped and mixed with the crushed grain some hours before feeding. During the winter months a considerable quantity of chaff from clover hay

Fig. 22.—Gathering Hog Feed in the Canadian Corn Belt.

is given to the hogs. It is mixed with the slop and is much relished. In the summer the growing and fattening pigs have a run of 2½ acres, and receive whey and corn. As the hogs approach finishing their grain ration amounts to about 5½ pounds per head along with the whey. This farmer frequently feeds more hogs than he can raise, for which he is able to secure extra whey. The litters are never separated from their mothers and usually suckle until 8 or 9 weeks old.

Farmer No. 6 feeds the whey from eighteen cows. He keeps two sows which usually farrow in February and August. Both sows and growing pigs are turned out in spring as early as practicable and fed on shorts, oat chop, along with skim milk until whey is available. The grain food is allowed to soak for some hours and is fed warm in a fairly thick slop. Spring litters when weaned are allowed to run on the grass pasture until a plot of rape is ready for them. The rape is grown in drills, and is found to give excellent satisfaction during the three years in which it has been used for growing hogs.

In 1913 on this farm fifteen hogs were pastured on an acre, but this experience indicated that this number of hogs should have about 1½ acres for best results. The hogs received a liberal amount of whey each day, as well as a small ration of shorts mixed with ground corn. During the two final weeks the hogs were housed and given a rich ration consisting chiefly of oats and barley meal mixed with whey. The hogs, which were pure-bred Yorkshires, were sold at 7 months old, weighing 225 pounds each.

Farmer No. 7 feeds whey from the milk of twelve cows. He keeps two sows which farrow usually in March and August. The hogs are weaned at about 6 weeks old.

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Spring litters are kept in the house. Until 3 months old the ration consists of slop made from shorts with a small proportion of mixed grain and whey. After the hogs have reached the age of 3 months they are given alfalfa in racks. The grain food is enriched by the addition of barley chop. Hogs thus fed weighed at 5 months and 2 days old, 175 pounds each. Fall litters received pulped magnesia with the same grains as are fed in the summer. Weanlings are given a light grain ration, which is gradually increased to about 6 pounds a day at 6 months old.

Farmer No. 8 feeds the produce of three sows from the whey of twenty cows. Fall litters are carried over winter on cheap food, such as roots with a little grain, and are thus ready when the cheese factories open in spring to take a liberal feeding of whey. The spring litters are kept in the open yard during the summer, and are given in addition to the slop of barley and oats mixed with whey, such green foods as red clover, vetches and alfalfa. The hogs are fed inside during the finishing month.

Farmer No. 9 keeps seventeen cows. He keeps two brood sows which are retained until 4 or 5 years old if they prove satisfactory mothers, raising eight to twelve at a litter twice a year. The litters are penned up the year round, and in summer have the run of a small yard. In addition to as much whey as they care to use, they receive a mixture of barley and oat chop during the growing period, to which is added low-grade flour for finishing. The dry food is placed in the trough and the whey poured over it. The litters are weaned at 6 weeks old, and are started on skim milk, which is gradually substituted by whey. The hogs are usually sold at from 5 to 6 months old, weighing from 180 to 200 pounds.

Fig. 23.—Scene on a hog farm in the Canadian corn belt.

Farmer No. 10 on 100 acres keeps fifteen cows, from which he receives the whey during the summer and skim milk during the winter. He keeps two sows which farrow in March or April and in September or October. The sows, when dry, live chiefly on roots in the winter and grass in the summer. Weaning takes place at about 8 weeks old. In addition to barley and oats ground together, low-grade flour and rye shorts are fed. For young stock shorts with whey constitute the chief ration. It was fed in a slop, freshly made. Ground grain is considered better to be soaked twelve hours in the whey before feeding. The orchard is used for the growing hogs during the summer. They usually run out until within two weeks of being finished. Spring litters are usually ready for market at from 6 to 8 months old, while fall litters require a little longer time. If one has plenty of whey it is considered economical to allow hogs to take their sustenance from this and from pasture until they reach about 150 pounds each. They are then in excellent condition to feed either outdoors or inside, on a stronger ration, on which they finish up very quickly. In the absence of roots, which are fed when available in winter, corn ensilage is fed to growing hogs at the rate of about one bushel for a dozen hogs weighing 100 pounds each.

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Fall litters run out until weaned and afterwards receive mangels once a day at noon, usually pulped and mixed with chop, about three parts mangels to one part chop. The morning and evening meals consist of comparatively thick slop slightly warmed. During the housing season the hogs are occasionally given supplies of charcoal, wood ashes and even soft coal. These appear especially necessary to keep the digestion right when the hogs are being heavily fed.

FEEDING SKIM MILK.

The districts visited to learn how experienced farmers raise hogs on skim milk in conjunction with other foods, were of practically the same class as the cheese factory patrons, whose methods are outlined in the foregoing. The system of farming carried on might be considered of a general nature. In no case were large herds of cows milked, nor hogs fed in large numbers, as in the case of the cheese factory patrons. Practically every farmer visited raises two litters a year from each sow kept.

Farmer No. 1 secures the buttermilk from a creamery, for which he pays 13 cents per hundred pounds. At the height of the season, 300 gallons a day were used; it is fed as fresh as possible. Feeding is carried on only during the summer season. Pigs are bought in the spring as weanlings, and are sold finished towards the autumn. Grain feed is used, more or less, throughout the season. The grain food is given in mixtures, and is chosen more from the condition of the market than from any other cause. Oats are valued, especially during the early part of the season. The grain ration is fed dry in the troughs, and is followed with the buttermilk. The growing pigs receive buttermilk only once daily, and this is diluted to some extent, and with it given the grain ration. From 1 quart to 2 quarts is the quantity given for pigs from 50 to 100 pounds in weight. At no time does the quantity of buttermilk exceed 1 gallon, and this quantity is never reached until the pigs have reached 200 pounds in weight. An account was kept of the feeding of 550 hogs which averaged 210 pounds each at finishing. It was shown that it required about 5 pounds of grain, in addition to the buttermilk, to make 1 pound of gain. It was roughly estimated that this transaction gave a profit of about $2 per head.

Farmer No. 2 outlined his method by giving an account of the feeding of twenty pigs, which were valued at $3 each when 6 weeks old, and which sold, weighing 212 pounds each, at 6 months old, for $8.40 per hundred. These pigs received for two and one-half months the skim milk from eight cows giving only a moderate quantity, as half of them had been milked for eight months.

The grain food consisted of middlings costing $23 a ton, mixed with milk and enough water to make a fairly thick slop. This was fed twice a day. Mangels fed alone constituted the noon meal. At the end of three months the grain food was changed to a mixture of six parts oats, two parts barley and one part peas, grown and ground together. When 4 months old the milk feeding was discontinued and water substituted, the milk being needed for calves. During the finishing month the proportion of peas was increased to about one-third of the mixture.

On this farm alfalfa pasture is substituted for skim milk during the summer months. The grain ration is practically the same as that fed in the winter with skim milk. On 2 acres of alfalfa nineteen hogs were pastured and brought to a finishing weight at 6 months old.

Farmer No. 3 farms 300 acres, on which he keeps fourteen cows and from three to four brood sows. In addition to the two litters a year, which are raised on the farm, occasionally a small number of additional hogs are purchased for feeding. Pigs are weaned at 6 weeks old. Both sows and litters run on pasture in the summer, or have a roomy pen in winter. Especially to young pigs the milk is fed warm, direct from the separator; in no case is the milk allowed to sour. The grain food consists of shorts chiefly, for the first three or four weeks; to this is added a small quantity of finely-ground oats. The grain food is soaked in milk or water twelve hours before

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feeding. When the milk is not plentiful, mangels are substituted in winter, and green feed in summer. No mangels or green feed are used during the two final weeks of finishing. Pigs are usually finished at 6 months old, weighing about 220 pounds each.

This farmer sees great profit in allowing his growing pigs to glean the grain fields after harvest, more especially those that have been seeded to clover. Summer litters thus treated, without receiving other food, came in at the advent of cold weather, weighing almost 100 pounds each.

Farmer No. 4, from his 150 acres, sells beef, pork and cream. He grows all the grain that he uses. The pork sold was claimed to have given the greatest profit. It was estimated that the grain necesssary to feed fifty pigs, with water as the liquid, would supply 100 pigs if skim milk were used instead. The pigs are fed sufficient grain at all times to keep them thrifty and growing rapidly. The grain food is allowed to soak in the milk one meal ahead, except in hot weather, when it is mixed as wanted. The fall litters are not heavily fed during the winter, but are carried over on such cheap food as mangels with a light grain ration. These are in excellent condition for heavy feeding in the summer months. A quantity of soft coal cinders and ashes are given to the pigs once a week.

Farmer No. 5, from his 150 acres, sells beef, pork and cream. He grows all his feed except a little bran. The litters are weaned at 6 weeks old, but at 3 weeks are given a separate pen, in which they learn to feed on skim milk and shorts. Weanlings get oats ground finely, and when 2 months old commence to receive a small proportion of barley and peas. The finishing ration consists of one part oats and one part peas or barley, all ground finely. In winter, grain is fed twice daily, with broken mangels at noon. A litter of eleven pigs thus fed, at 5 months and 12 days old, weighed 200 pounds each and sold for $209. In summer, skim milk is fed at the rate of from 2 to 3 pounds, to pigs weighing 100 pounds each. One-third skim milk with two-thirds water appeared to this farmer to give the maximum of results for the skim milk. This constituted his guide in the number of pigs to keep. The grain food is soaked one meal ahead, and is given in sufficient quantities to satisfy the appetite. This farmer regarded his pigs as the most profitable stock on his farm.

Farmer No. 6 kept an accurate account of the feeding of twenty-two pigs. They received mangels, mixed grain and skim milk. The food consisted of:—

16 tons, 1,720 pounds mangels at $4 per ton	$ 67 44
5 " 1,175 " meal at $23 per ton	128 51
5 " skim-milk at $4 per ton	20 00
Total	$215 95

The hogs were sold as follows:—

9 hogs weighing 1,940 pounds at $9.40 per cwt	$182 36
11 " " 2,120 " 9.25 "	196 10
2 " " 385 " 9.25 "	35 61
Total	$414 07

The cost of these hogs was $4.86 per hundred pounds, while their average selling price was $9.31 per hundred pounds, which left a profit, not including labour, of $4.45 per hundred pounds.

RAISING HOGS WITHOUT DAIRY OFFAL.

Many hogs are raised on farms where little or no dairying is carried on. By the use of roots in winter and forage crops in summer, hogs are very profitably raised, more especially where the grains fed are grown on the farm. The practices of feeders on such farms do not differ materially from those described for dairy farms, except that special care has to be taken in getting the young stock safely over the few weeks following weaning. Under these circumstances, weaning should be deferred as late as practicable, and need not be done under 8 weeks of age even when two litters per year are raised.

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Swine growers in some sections, particularly in the western provinces, are following the plan of raising three litters in two years, which is a litter every eight months. There is sufficient time between farrowings to permit the pigs to follow the dam until they are 10 weeks or 3 months old. They are then less likely to have their growth arrested when weaned, and the sow will have time to regain her vigour before entering upon another maternity period.

The counties of Essex and Kent do comparatively little dairying, and still raise many hogs. The practice of raisers in this Canadian "corn belt" has changed greatly in recent years. Whereas it was the rule to allow hogs to gather their living very cheaply until the corn harvest arrived, and then unload heavily within a brief period, it is now the general practice to feed well from the beginning and market the hogs all through the year as they become ready. Besides corn, much shorts and barley are fed, more especially to young stock and breeding animals. Poland-China, Duroc-Jersey and Chester White breeding is evident everywhere, but the Tamworth is a favourite also, and a farmer here and there keeps Berkshires or Yorkshires. To encourage the bacon type, a firm of packers at Chatham has for some time been exchanging bred bacon type sows for fat sows of the thick type. Many local hog raisers are taking advantage of this.

Farmer No. 1, on 150 acres, produces in a year $1,500 worth of hogs and buys from 10 to 12 tons of bran and shorts, besides perhaps 200 bushels of bush beans. He keeps from six to eight grade Tamworth sows, which he claims are better mothers than Durocs previously kept. Litters are born in September and March and are weaned at from 6 to 7 weeks old. For two to three weeks weanlings get a small ration of milk, but as the milk of the farm is sold in town none is available for hogs after they are well started. When fed it is given alone and a grain food which consists of finely-ground oats and shorts is given in a separate trough. When weaned the sows are kept in and the litters turned outside. On this farm alfalfa is much depended on for summer pasture, as well as coarse fodder for the breeding stock during the winter season. The spring litters run constantly on alfalfa pasture until they weigh about 175 pounds each. They receive a light grain ration at first, which is gradually increased but never fed heavily. As soon as the corn is fit to use it is fed in the ear. Its feeding quality is believed to be improved by soaking. The finishing ration consists of corn and shorts fed dry. Fall litters run on pasture until winter comes on, when mangels are substituted for the pasture. Sufficient roots are grown to provide a supply until the pasture season again arrives. Dry sows get very little besides alfalfa hay and roots during the winter season.

Farmer No. 2 keeps eight sows of Duroc-Jersey, Chester White and Tamworth breeding, on 120 acres of land. March and September are the farrowing months and the litters are weaned at about 8 weeks of age. Spring litters go out with their mothers as early as there is pasture. The little pigs are fed bran and shorts mixed with water for the first month after weaning, then a small proportion of chopped oats is added and an occasional ear of corn given. The grain ration is increased from week to week as seems appropriate. The hogs are finished at about 8 months of age.

Fall litters are fed in a very economical way from the standpoint of labour. The hogs of all ages have the run of a yard with access to pens, and are fed corn on the stalk and alfalfa hay. After the hogs have taken what they want of this the cattle are allowed to consume what is left. In addition the hogs get mangels once a day. This is continued until pasture arrives, when the hogs are turned out and finished on corn in the ear and a mixture of wheat and barley in equal parts, finely ground. Portable pens provide most of the shelter in the yards during the winter and in the pasture field during the summer. Fall litters are usually from 9 to 10 months old when finished. A small acreage of very early corn is grown each year, and as soon as this is fit to use the hogs are turned into it and have access to alfalfa pasture. Pigs weighing 175 pounds each fed in this way gained about 3 pounds a day until finished

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at from 220 to 240 pounds. On the main crop corn fields sufficient corn is left on the stalk to provide food for the hogs of the farm until winter compels housing. About 110 hogs a year are fed off, for which was purchased 5 tons of shorts and 2 tons of bran.

Farmer No. 3 follows an unusual method in the summer feeding of hogs. He stacks corn in the fall in a clover field, and when the clover is fit to pasture the following spring the hogs are turned in and are fed sheaves of corn thrown to them from day to day. After the stack is sufficiently lowered to enable the hogs to climb on the top of it, no more attention is required. The saving of labour in this method is estimated to more than equal the loss of the corn fodder. The hogs drink at a running stream.

Farmer No. 4, on 100 acres, keeps twenty sows. He follows the unusual method of fattening off his young sows after the first litter, which arrives in July. These sows are pastured until corn arrives and then finished on the corn fields with alfalfa pasture. The litters run on alfalfa pasture and receive a small mixed grain ration until winter, when they are fed alfalfa hay and corn in sufficient quantities to keep them growing well. They are then turned on alfalfa pasture, where they are fed corn in the ear until finished.

Farmer No. 5, on 75 acres, keeps four sows. In addition to alfalfa hay and corn grown on the farm, a small quantity of shorts is purchased. A labour-saving method on this farm is to feed peas in the straw. If he had more land this farmer would hog down his corn in the fall, which he considers the ideal way. Alfalfa is regarded as an ideal food on this farm.

Farmer No. 6 keeps six sows of Tamworth breeding. From these, fifty-eight head were raised and at 7 months of age weighed 247 pounds each. Spring litters are pastured on grass and receive slop made from mixed grain chop and boiled beans. This is continued until the new corn is ready for feeding. As soon as corn is ready it is thrown to them in the cob, but slop feeding is continued until they are finished. On this farm the western method of following fattening cattle with hogs is practised, but the hogs receive, in addition to what they pick up, small rations of shorts and oat chop fed in slop. The hogs are not allowed to remain with the cattle at all times, but are turned into the feed lot about three hours per day. This farmer emphasized the importance of open-air feeding for hogs receiving corn as their principal diet. While the amount of exercise they take may cost something in gains, it is estimated that the thrift secured and the saving of the labour more than counterbalance the loss of weight. Hogs finished in this way always ship well.

Whether from a shortage of help or from habit, or a combination of these, few of the farmers visited kept books in connection with their hog feeding. All agreed, however, that their pigs constituted very profitable branches of their farming operations, indeed some went so far as to claim that their hog money was the most easily acquired revenue from the farms. None found it necessary to use expensive or elaborate pens. In most cases the hogs were kept in frame buildings, not closely built, but on the contrary, as a rule, quite airy. Freedom from draughts, and a dry bed in winter and open shaded quarters seem to many to be all the housing that is necessary.

PORK PRODUCTION ON THE PRAIRIES.

Hog raising has increased rapidly in the Prairie Provinces during the past few years. The continuous high prices for hogs fit for killing has directed the attention of grain growers to the "hog route" for their coarse and damaged grain, with the result that western packing houses have been unable to absorb the supplies which have found an outlet in the plants of the older provinces. During the early months of 1914, weekly shipments of live hogs were received in Toronto and Montreal from Winnipeg, while during the same period, hogs, raised and killed as far west as Calgary were sent east for curing.

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To learn the methods of extensive feeders on the prairies, sets of questions were sent to a large number of hog raisers who are finding pork production profitable. Their replies are summarized below.

Housing.

Generous supplies of straw have gone far to solve the housing problem. While a small proportion of swine raisers use well-built pens, many more shelter their sows around a pile of straw during the winter months, and use any sort of frame structure that will turn water during the summer. The A-shaped colony pen is becoming quite popular in many sections. These are buried in a deep covering of straw for the winter season. Any sort of open frame that will support a straw pile is claimed to provide excellent winter shelter.

Care of Sows.

A favourite treatment for dry brood sows is to allow them to run on pasture in summer, stubble in the autumn, and to live around a straw pile or in a pen during winter.

The majority raise only one litter a year, as the winter season is not favourable for young pigs. By affording the sows liberal exercise in winter, litters come strong in the spring. Oats form the favoured ration for milking sows, but a number who replied add ground wheat after the litters are 2 weeks old. Wherever used, mangels are spoken of favourably.

Weaning.

Those who raise two litters a year wean at from 6 to 7 weeks old, while many others allow the litters to wean themselves, which they usually do at from 10 to 11 weeks old. When treated in this way on pasture and fed in a separate corrall on oats, barley, skim milk and kitchen slops, pigs are easily made to weigh 100 pounds at 4 months old.

Pasture and Soiling Crops.

Quite 50 per cent of hog raisers provide some sort of summer pasture. Some use alfalfa, but the majority rely on green oats, barley and rape. A few in Alberta are sowing fall rye for late fall and early winter pasture. Only a small percentage feed roots to their hogs in winter.

Grain Mixtures.

Ground oats is the commonly-used food for milking sows. When this is fed with skim milk or succulent pasture, excellent results are obtained. Some mix shorts with oats, others add barley or wheat, but when these heavier grains constitute 50 per cent or more of the ration, losses of young pigs are said to occur from 'thumps' and digestive troubles. Weanlings are usually fed ground oats in the form of a thin slop. Self-feeders are quite commonly used for both store pigs and those that are being finished. With the former class a limited grain ration is used and in some cases slop feeding is practised, using bran freely. In many sections hogs are finished on ground barley or wheat, or a mixture of these fed dry from a self-feeder. In outlying districts, where there are no feed grinders, the whole grain is either soaked or boiled. Most hogs are marketed at from 7 to 8 months old, weighing about 200 pounds each.

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Returns from Grain as Pork.

Few correspondents keep accounts of the cost of feeding. A correspondent at Indian Head claims in selling hogs at $6.75 per hundredweight to have got 60 cents per bushel for barley worth only 29 cents on the market. Others claim to get from 60 cents to 85 cents per bushel for wheat, 40 cents to 65 cents for barley, and from 30 cents to 45 cents for oats. Much depends upon the skill of the feeder. Unskilled or careless feeders do not secure these values.

Self-Feeding in Pasture.

In the western provinces many swine growers provide a suitable pasture lot into which a hundred or more hogs are turned. The forage in this pasture lot may consist of alfalfa, Brome grass, Kentucky blue grass, dwarf Essex rape, or some kind of grain crop, preferably oats or barley. In order to secure the best results from this forage, it is necessary to keep it from attaining a height of more than six inches, otherwise the forage becomes woody and indigestible. Self-feeders are distributed throughout the pasture lot and are kept continually supplied with ground oats, wheat or barley, or with a mixture of these.

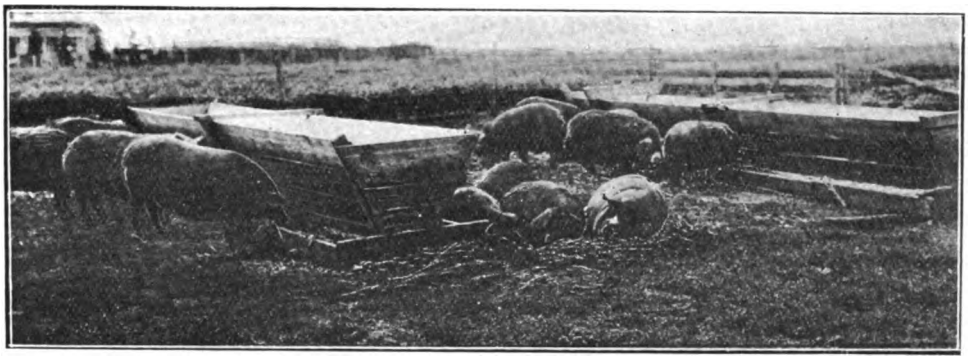

Fig. 24.—Self Feeders on an Alberta Hog Farm.

Western swine growers deem this to be the most economical method of finishing hogs. It is evident that this method is saving of labour and for that reason has much to commend it in a country where competent labour is difficult to secure. Besides, by this method a larger percentage of fertilizing material is returned to the land than is ordinarily the case where swine are kept closely housed or confined in small paddocks, and the premises can be kept sanitary with little difficulty. There is, however, reason to believe that because of the ease with which swine can be fed under this method, the self-feeder is more largely employed than it should be. Weanling pigs which should be fed sparingly on dry grain unless liberally supplied with milk, are often permitted to have constant access to the self-feeder, with the result that they eat too freely and become foundered just at the time when they should be making the most economical gains.

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HOUSING.

Much of the success of hog-raising depends upon suitable housing. Suitable housing does not, however, demand expensively-built houses and pens designed so as to provide summer temperature during the winter season. In an ambitious desire to treat swine with due consideration for their comfort, many progressive hog raisers have wasted large sums of money in building elaborate, warm houses for their herds. Having wintered their stock of all ages and conditions in these structures for one or two seasons the mistake they had made became apparent by reason of the fact that the swine, instead of showing greater vigour, exhibited signs of ill-health in the form of coughing, lameness, scurfiness of skin and other evidences of lack of thrift. The chief difficulty from these close houses is due to the lack of exercise taken by the swine kept in them. After rising from their comfortable beds to take their food, which is usually provided regularly, near at hand and in palatable condition, the pigs fill themselves and again return to their resting places. This mode of living followed for weeks and months at a season of the year when outdoor life is uninviting, even should the pen door be left open, is attended with indigestion, constipation and other forms

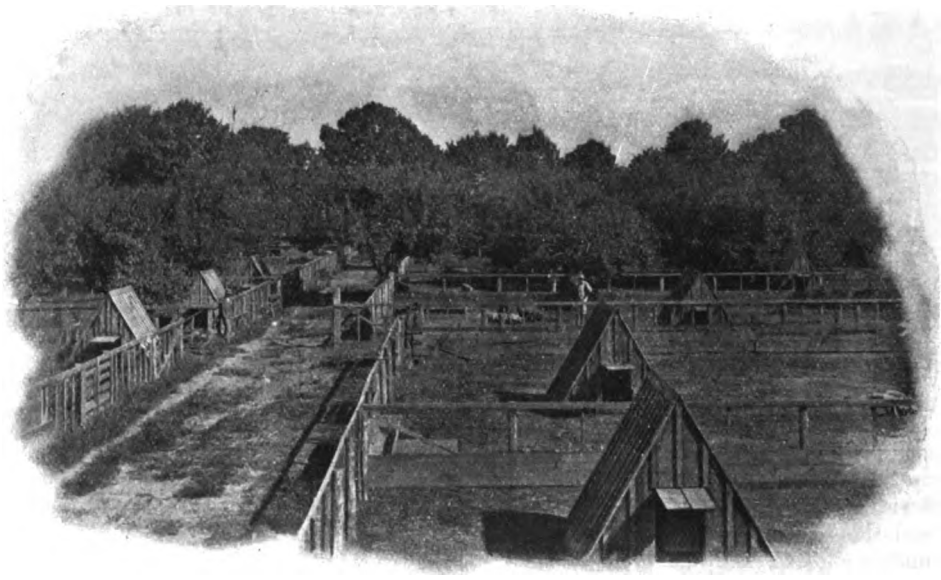

Fig. 25.—Movable Pens in Feed Lots.

of sluggishness, causing weak litters, lack of a good milk flow in dams, stunted weanlings and slow gains in older hogs. Exercise is one essential for swine of all ages if hog raising is to be made a success, and it is in not providing this that the warm pen used for both sleeping and feeding fails. For young litters coming in cold weather, a warm pen is necessary, and rather close quarters are also conducive to the most profitable gains during a hogs final fattening period, but at no other time in a hog's life is close housing advantageous.

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For brood sows due to farrow in the late winter or early spring months, there is no better shelter than the movable cabin. A number of these can be ranged side by side in or near the barn-yard. If kept comfortably bedded, four or five large sows will lie very comfortably in a cabin constructed according to directions given further on. The old style of rail creep beneath a straw stack, so long as it is closed on three sides, affords a fine bed for breeding sows or even growing pigs. On some of the most extensive hog-breeding establishments the only shelter given the sows in winter is an old barn or shed, lined up to keep the draughts out, and having a constantly open door which affords free and unlimited access to the open air. The feeding is done in the open, which compels the herd to take a good amount of daily exercise, upon which good health so much depends. Sows thus housed and fed on food composed of pulped roots and chopped grain, bran, etc., given in a rather dry consistency, will maintain a fine condition for successful motherhood.

Plan and Description of Movable Pen.

The moveable pen shown in the illustration on next page is adaptable to various requirements. It may be used as a shade in summer and a protection from the cold in winter. As a summer pen it should be set in a dry location where the air may circulate freely about it. In summer these pens should be placed in the hog pasture, much better results being obtained if the pasture is a large rather than a small field. As a winter house it should have a sheltered location, preferably close to the barn-yard.

A pen made of single inch lumber does admirably if well made and all cracks are carefully battened. The battens should be at least 3 inches wide and these securely nailed on, the nails being clinched on the inside to guard against warping.

Whether for summer or winter use a floor is necessary, both for the comfort of the animals and the strength of the pen. Two-inch planks nailed on 4 by 4-inch cedar sills is desirable for the floor. The ends of the sills are shown in Fig. B. It is well to round off the lower angles of the sills, making them into runners for moving the pen from place to place. A ring or a U clevis may be fastened to the front or back end of each of the outside sills.

Figures B and C show a form and size of doorway that answers very well for the hogs to go in and out, but it is not large enough for an attendant to enter with comfort. It is well to have a doorway at least 5 feet high. The door should be cut in half so that the upper part may be kept closed when not in use. Many hog raisers hang the lower to the upper half in such a way that the former swings in and out as the hogs enter or leave the pen. In summer the lower door may be hooked up out of the way. On severe winter nights the door may be protected by a heavy curtain or a bank of strawy manure to keep out cold draughts, which are always detrimental to a hog's welfare.

A pen arranged for cold weather requires a window in the front (south end) to admit the sun's rays. This may be placed in the upper half of the door or above it.

A pen requires an opening for ventilation. Some recommend a hole 3 or 4 inches across at the back, close up to the peak; another form is shown in Fig. B, and still another in Fig. D, which is perhaps the best.

An 8-foot pen requires about 200 feet of lumber. Sixteen-foot boards are best to use, as these cut without waste. This pen would also require 56 feet of scantling for sills, and 64 feet of planking for flooring.

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A pen of these dimensions will accommodate from eight to ten growing pigs or a sow and litter.

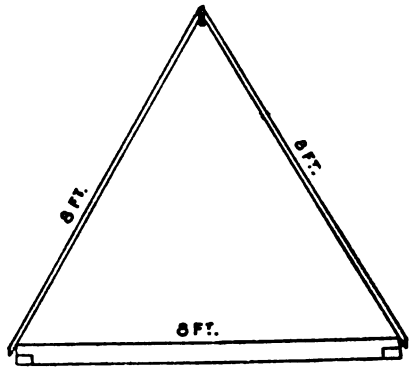

Fig. A.—Showing sills made of 4 by 4-inch scantling, and slope of roof. Two 4 by 4-inch scantlings, 16 feet long, make the sills.

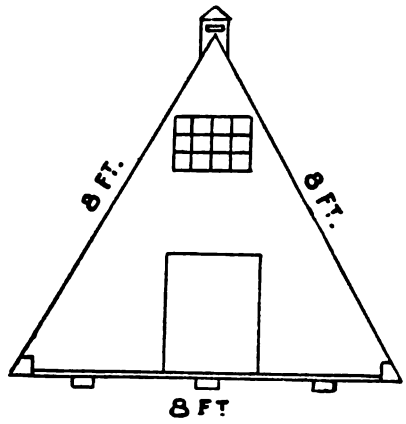

Fig. B.—Front view of portable hog pen, where three scantlings are used as sills.

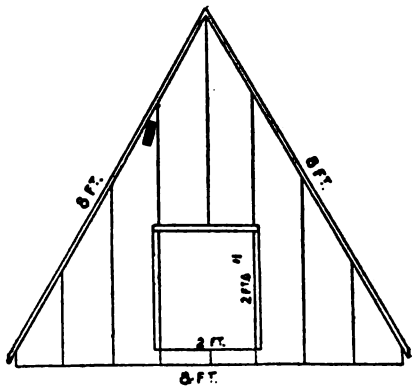

Fig. C.—Front view of Fig. A.

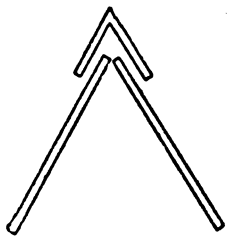

Fig. D.—Showing a method of arranging ridge boards to afford ventilation when pen is intended to have doors closed.

Fig. 26.—The Portable Pen.

The Large Piggery.

Since every farm upon which swine are raised must have a hog pen of greater or less dimensions, the most important considerations that enter into the construction of a modern piggery will be dealt with. The chief qualifications of a piggery are dryness, ventilation, freedom from draughts, light, reasonable warmth and convenience. Of these, dryness, which is largely governed by venti'ation, is of first importance. Masonry walls and floors have been used in a number of expensively constructed pens, but these are usually cold, comfortless and damp during the winter season. Without doubt wooden walls constructed in such a way as to provide for a complete dead air space in the centre are the best. A very satisfactory wall is made by setting 2 by 4-inch scantlings on end, and boarding inside and out with rough lumber. Both inside and outside should then be covered with tar paper well lapped at the joints and then closely boarded up with matched lumber. A very suitable

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outside covering would consist of clapboards or lumber of good quality nailed on perpendicularly and having the cracks battened. The inside tier of boards should consist of matched lumber. A tight ceiling without an effective system of ventilation is frequently a wet and even dripping one, or is coated with frost in very cold weather, and this is usually attended with dire results for the pigs.

Probably the most satisfactory ceiling at the present time is one constructed of boards or poles separated at such a distance as to be easily pervious to the atmosphere. This, when covered several feet deep with straw, provides perhaps the most suitable style of ventilation, and therefore the driest pen that may be secured without artificial heat.

A number of extensive hog breeders in the country have resorted to the use of artificial heat in their hog pens. This is provided, not so much for the sake of the heat for the animals, but for the cooking of foods. The escaping steam from the cooker should not be allowed to escape into the hog pen on account of the moisture that it would deposit in the building. Where such a system of heating is installed the question of ventilation is very easily solved, and the pen is usually comfortably dry. Artificial warmth, however, for any class of live stock has its disadvantages in render-

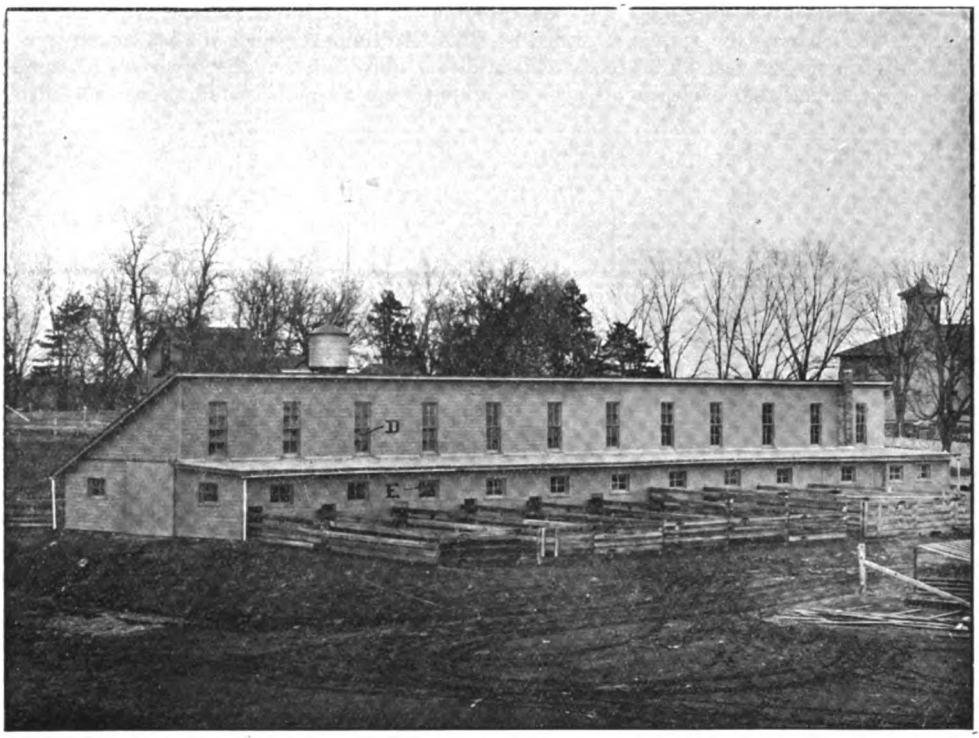

Fig. 27.—A well lighted Piggery.

ing the animals kept within its influence subject to colds and lack of vigour. Where only a small number of sows are kept, there is no better pen for farrowing sows in cold weather than a box stall in a cattle stable, which seems to possess a warmth and condition of atmosphere suitable to the young pigs.

The question of light is receiving much greater attention than it did years ago. Every pen where swine are kept, more particularly in the winter season, should have an abundance of sunlight. To get this a large proportion of the wall on the east, south and west sides should consist of windows, which should be made double and very close in order to conserve the warmth of the pen.

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There is no better material for a hog-pen floor than cement concrete. This, however, is not a suitable material for the hogs to lie on as it is usually cold and in many cases damp, even though large quantities of bedding are used. An elevated sleeping pen, whether it be a platform some 3 or 4 inches above the floor, or elevated sufficiently high to allow the pigs to run underneath, is quite popular throughout the country. The "upstairs" plan has the disadvantage of shutting out light to some extent, but the advantage of providing a large additional floor space for the animals. Where the pen is of good size the lower sleeping platform is perhaps to be preferred. When this platform is limited in space to little more than is sufficient for the hogs to lie comfortably there is little or no probability of the bedding being dampened or soiled in any way by the hogs.

For the guidance of hog raisers who wish to build large piggeries, three styles of buildings have been selected for description. Each has been used sufficiently to prove its suitability from the standpoint of the hogs, the owner and the attendant.

A Well-Lighted Piggery.

A piggery possessing new and desirable features is in use at the Agricultural College at Urbana, Ill. It was designed by Prof. William Dietrich of that institution. The building is 120 feet by 30 feet, with an 8-foot alley between the two rows of pens. It is so arranged that each row of pens is lighted from a row of windows on the south

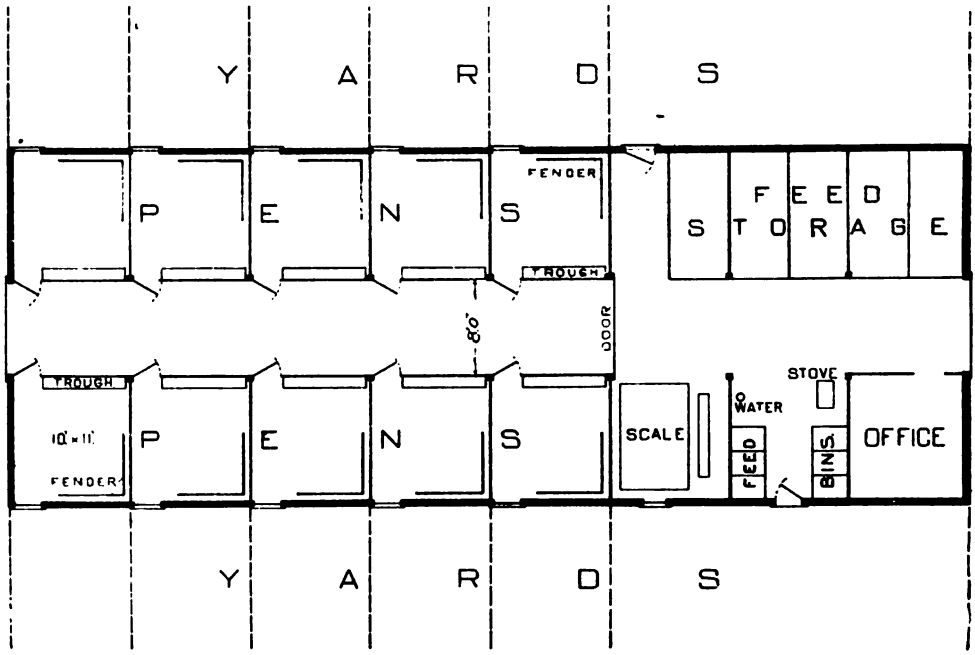

FIG. 28. FLOOR PLAN (PORTION) OF WELL-LIGHTED PIGGERY.

side of the building. Referring to the situation of the windows, Prof. Dietrich writes: "The important factor to consider is the height of the windows, represented at E and D in the photograph, in connection with the width and manner of construction of the building. The window E is so placed that at noon of the shortest day of the year the ray of light which passes through the upper part will fall upon the floor of the south side pen on the opposite side from the window. This allows the total amount of light coming through the window at this season of the year and time of the day to fall

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within the pen. In the morning and in the afternoon when the sun is not at its highest point, a part or all of this beam of light will pass beyond the pen. The lower part of the window D in the upper part of the building performs the same function for the pen on the north side of the alley as does the window E for the pen on the south side. By this arrangement the pen floors receive the greatest amount of light at a time when it is most needed, viz., during the winter months, to warm and dry the building.

The ground floor is represented by Fig. 28. The alley, 8 feet wide, allows of driving a cart through either to bring in feed, etc., or take out the manure. The pens are 10 feet wide by 11 feet deep. Each has a doorway leading to the outside which is opened by sliding upwards, and a door leading into the alley. These doors open so as to turn the pigs toward the front of the building where the weigh scales are situated. Fig. 29—the interior view—shows a swinging panel above the trough.

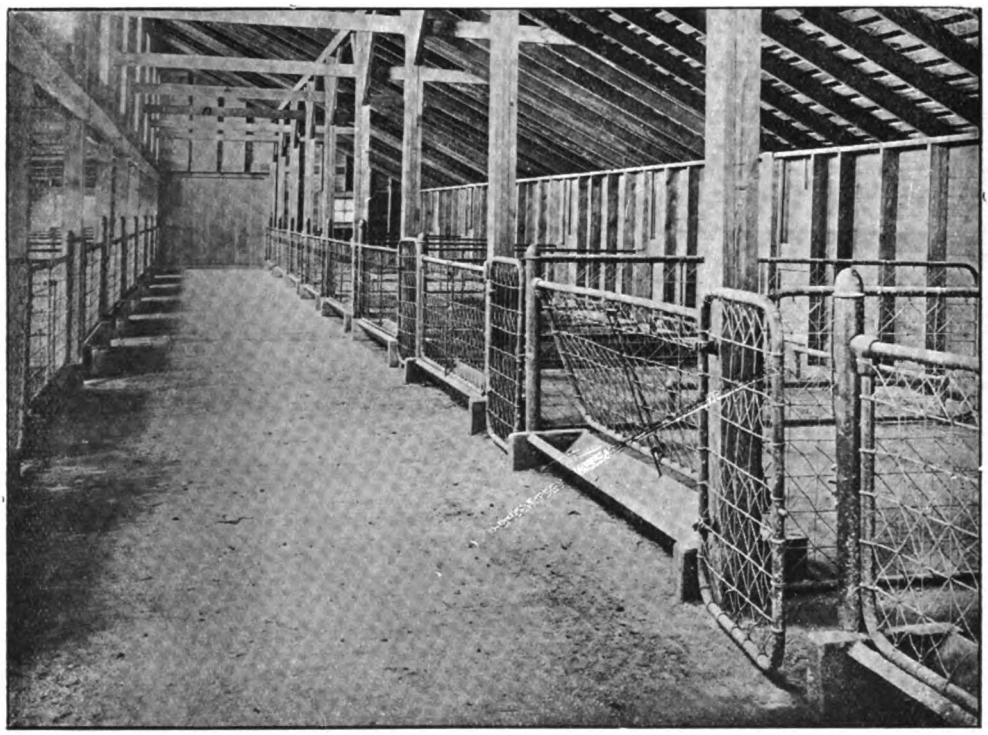

Fig. 29.—Interior view of well lighted Piggery, showing the north row of pens lighted from upper windows.

The fender is made of 2-inch tubular iron bar placed on 9-inch iron posts of the same dimensions and set in concrete in the floor, 6 inches from the wall. This is to prevent the sow crushing her pigs at farrowing time, as she will necessarily make her bed in the unoccupied corner. The platform scale is fitted with a frame, and the door opens so as to facilitate turning pigs upon the scales. A smaller door at the opposite end leads to a door through which the pigs may be driven to a loading chute. The large feed bins have openings from the main alley, so that feed can be unloaded directly from the wagon.

An alley leads through the door beside the feed storage to the yard outside. The two large yards may be used for boars. They are separate from the others and supplied with cots and troughs outside. The remaining yards are each 28 feet long, but may be any length desired and may lead to the pasture. The yard partitions are made of

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two lengths of common fencing, 16 feet and 12 feet, respectively. The latter is next the building and made into a gate so that it will swing. By opening all these gates and swinging them free away from the building an alley is formed for cleaning the pens if required.

For drainage purposes the floor of each pen slopes to a grating over a 4-inch drain which leads to a main drain outside of the building. The grating is laid in the bell end of a large sewer pipe. The floor and the drains may be flushed with water.

All the gates and partitions inside the building are made of wire-netting panels. Wire allows the sunlight to reach all parts of the pen, allows the hogs to see one another and the attendant. This makes the sows and young pigs quieter and prevents them from fighting when put together. Part of the floors are of brick and part of cement. The bricks are laid on side in the pens and on edge in the alleys. A wooden floor of 1-inch or 1½-inch lumber could be laid in the corner of each pen for a bed for the hogs.

HOUSING ON THE EXPERIMENTAL FARMS.

For a number of years the Experimental Farms have given much study to the subject of housing swine. In 1912 a new piggery was built at the Central Farm, and since then buildings fashioned after the same model have been put up at a number of the Branch Farms and Stations. These embody the characteristics that make up

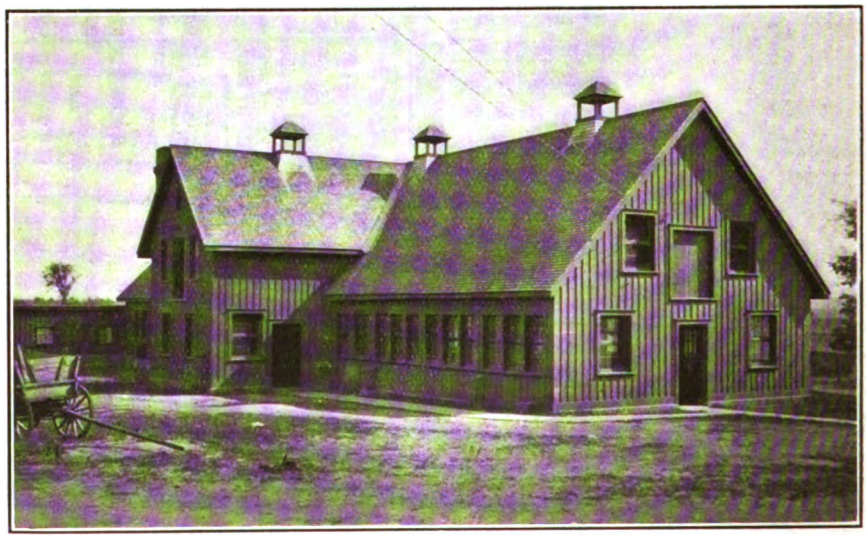

Fig. 30.—Main piggery, Central Experimental Farm.

an ideal hog pen. Fig. 29 shows a view of the piggery at the Central Farm. Those at the Branch Farms are of the same design but of less size. Figs. 30 shows a floor plan of one of these smaller buildings. The points being demonstrated in these buildings are economy of structure, convenience in the feed room, storage, methods of feeding and the like; convenience in handling stock; permanency and, above all, sanitation, light, ventilation and general comfort.

The following description has special reference to the new piggery at the Brandon Experimental Farm. The length is 81 feet and the width of main part 32 feet. The outside walls are 13 feet high from the foundation to the square pitched roof.

The passage down the centre is 6 feet wide and the pens are each 10 feet by 12 feet. The feed room is 20 feet by 22 feet, including the stairway. The ceiling is 9 feet high.

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The sleeping pen, or nest, shown in squares within the pens are about 6 feet square. Each farrowing pen has a guard rail of 2-inch iron piping, 12 inches above the floor and 10 inches clear of the wall. The troughs, which are of concrete, are 6 inches deep and 10 inches wide inside, and 7 inches high outside.

Foundation.—The foundation walls and floors (except for root cellar which is clay) are of cement construction, while the superstructure is wood.

Drainage.—Ample drainage is provided with field tiles laid along the inside of the wall, while an 8-inch sewer tile is laid below the centre of the main passage, into which are drained 4-inch sewer tiles which drain each pair of pens. These are shown in the ground floor plan by sloping, broken lines.

Floors.—The floors of the pens are 2 inches lower at the front than the level of the main passage next the pens. The passage has a crown of 1½ inches to the centre. At the edge of the passage and directly against the concrete pen front a small gutter 2 inches wide is provided. The grades of the pen floors fall 2 inches in 3 feet to the gutter and from 3 feet back they rise 1 inch in 2 feet and then 2 inches to the back of the pen.

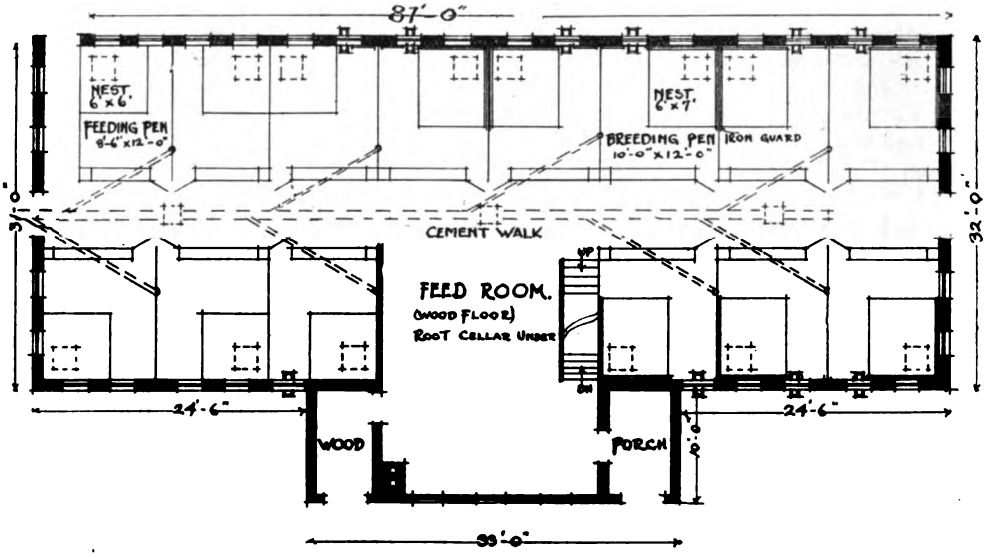

Fig. 31.—Floor plan of Experimental Farm Piggery.

Superstructure.—The lower 10 inches of the walls are of concrete, and above this, closely-built wooden construction. The posts and studs are of 2-inch by 6-inch planking. On the outside of posts and studs are two ply of building paper covered with planed boards put on vertically, with bevelled battens over cracks. The inside of the posts and studs are covered with a modern building paper, which is covered with ½-inch sheathing. The ceiling also is sheathed with ⅜-inch stuff. The roof is boarded on the rafters and covered with roofing paper and metal shingles.

As shown by the photograph and plan, generous provision is made for lighting. Each window has an upper and lower sash, each sash containing six 10 by 12-inch lights. The lower sash is stationary, the upper one is hinged on the top of it and fastened at the top with a spring catch and check chain. This provision allows for opening the top windows without creating a draught.

Ventilation.—The building is ventilated by the Rutherford system. The inlets are shown in the form of boxes below the windows on the outside of the wall, while the outlets are provided within the cupolas on the top of the roof. Each pen is provided with a fresh-air intake. These are of cement to the height of the cement in the wall, and have a wooden hood having a cover at the height of the window sills.

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These intakes enter the building in the form of a "U," which opens a few inches above the level of the floor. Each opening is protected by a grating. Each fresh-air intake is provided with a draught key to control the influx of fresh air. The foul air outlets run from the ceiling of the piggery, through the roof to the cupolas on the roof. These flues are made of two-ply ⅛-inch matched sheathing with a dead-air space between. The key in this ventilator is placed 1 foot from the bottom. It is fitted with control ropes to regulate the outflow of air.

The building is provided with a litter carrier, which runs on a metal track. The main line of the track extends from the manure pit outside, up the centre of the main passage, switching into the feed room, also switching over the pens.

Beneath the feed room is a root cellar which has a floor of earth. It is provided with a rough slat-box floor ventilator with uprights which are also slatted and rise alongside the cellar windows.

The grain feed is stored above the feed room in bins having hopper bottoms and chutes which open into the feed room below. A slop-mixing tank 3 by 5 feet and 2½ feet deep is arranged on wheels and can be placed under the meal chutes from above.

The feed room has a feed cooker provided with a steam-collecting hood so as to take the steam out of the building. It also has a sink for washing pails and other utensils and a tap with which is connected hose for washing the piggery, filling the cooker and other purposes.

The manure pit, 10 feet wide by 12 feet long, with cement bottom, is provided at one end of the piggery. It is arranged so that a wagon may be backed into it to be loaded.

Considerable experience with pens of this design has shown them to be quite satisfactory, and their essentials may safely be copied by swine raisers in a smaller or larger way, to suit their requirements.

At the Central Farm the main piggery is used chiefly for the breeding stock during the farrowing and necessary subsequent period, and for certain experimental work. The dry breeding stock, including the growing animals, are housed at all seasons of the year, chiefly in single board cabins placed in roomy paddocks and with feed troughs and fodder racks. This system of simple housing and outdoor life has been demonstrated to give excellent results in promoting the health and thrift of the animals.

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THE MACDONALD COLLEGE PIGGERY.

The piggery at Macdonald College is 133½ feet long, being built in two wings, both of which connect with the feed room at the east end. The northern wing is used for fattening purposes, while the southern and warmer section serves for the use of brood sows during the farrowing period. The foundation and walls proper are built of solid concrete, the inside of the walls being lined with a layer of brick, leaving a 3-inch air space between the brick and the concrete. These bricks are laid in cement

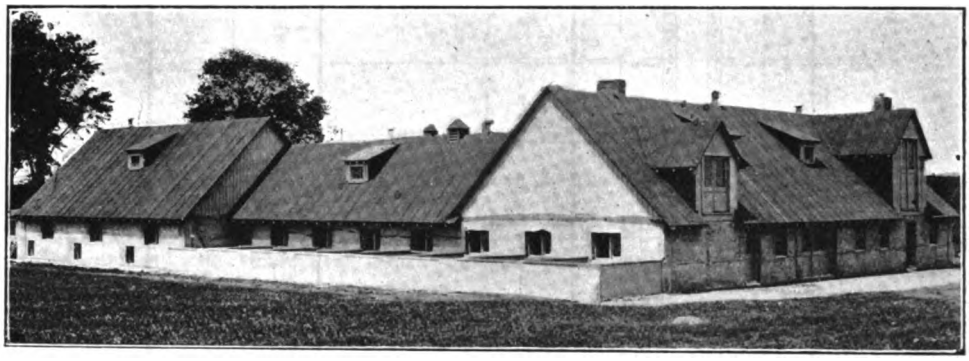

Fig. 32.—Macdonald College Piggery.

to a height of 3 feet from the floor, thus removing all possibility of the bricks being loosened by the pigs. The walls are 8½ feet high, the ceiling being level with the walls. The angle of the roof, which is a half pitch, constitutes the loft, it being used for the storage of straw and feed.

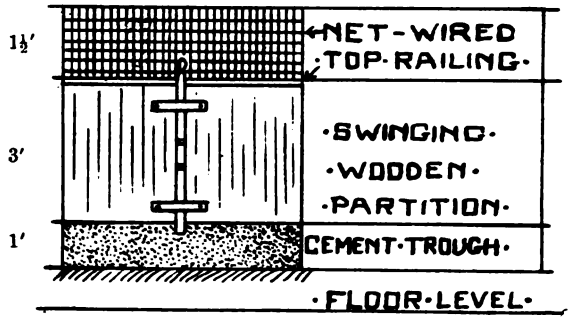

Fig. 33.—Swinging Front of Pen.

The floors are constructed of cement throughout and in addition the sleeping pens are provided with neatly fitted and removable platforms. All petitions are built of wood. Each pen is provided with a swing door, which serves a double purpose. When closed it forms part of the petition in the pen and when swung back the pigs are closed in their sleeping pens, thus facilitating the operation of cleaning and bedding. These doors are also convenient when moving pigs from one pen to the other. Concrete troughs fitted with a swinging front, as shown in cut, serve for feeding.

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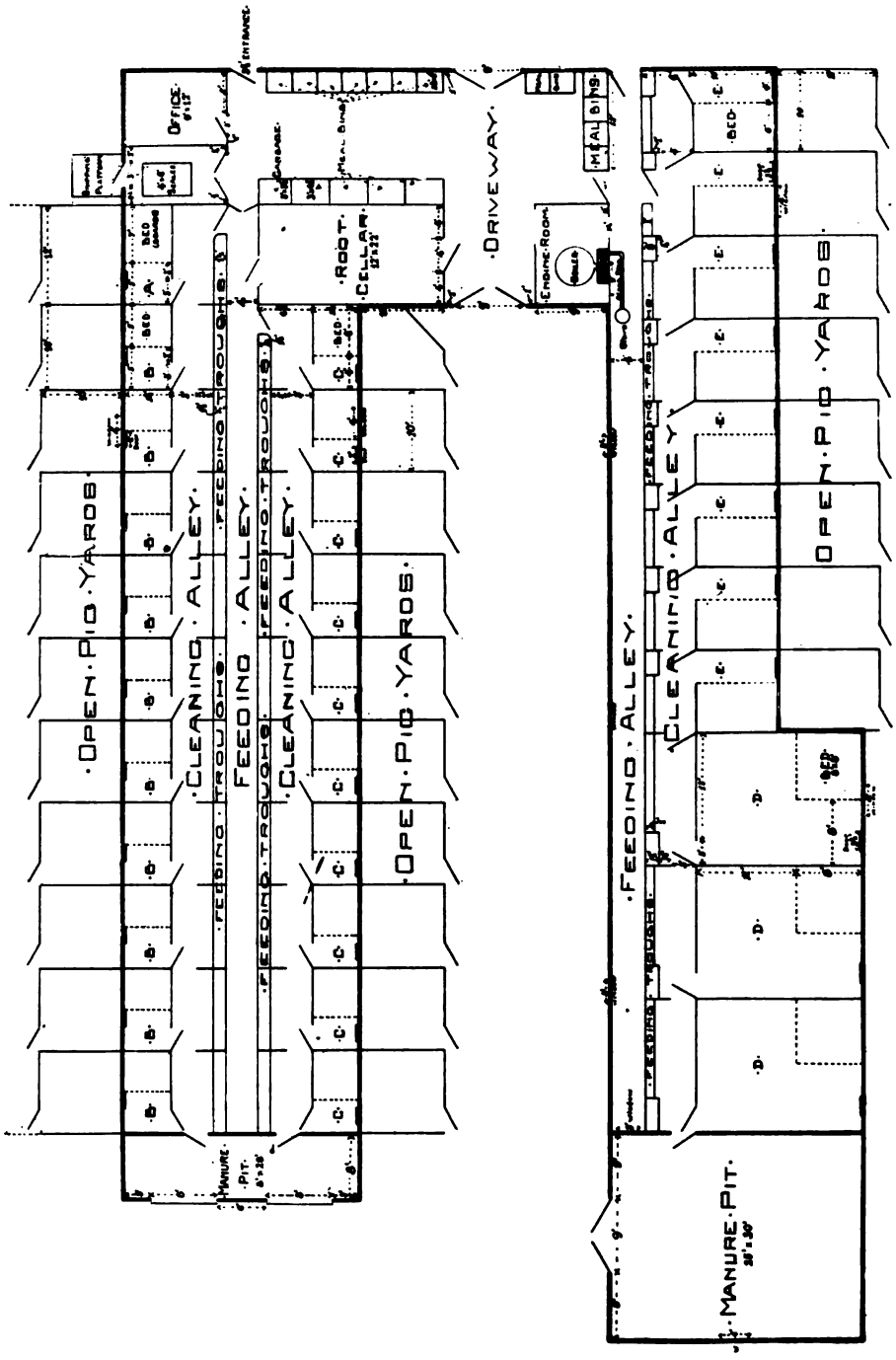

Fig. 34. –Floor Plan, Macdonald College Piggery.

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A very simple and efficient system of surface drainage is employed. The floors slope 1½ inches from the feeding passage and from the walls to a shallow gutter between the sleeping pens and the cleaning alley. This gutter has a fall of four inches in a hundred feet and runs directly into the manure pit at the west end.

In the ventilation system a number of well insulated shafts run directly from the

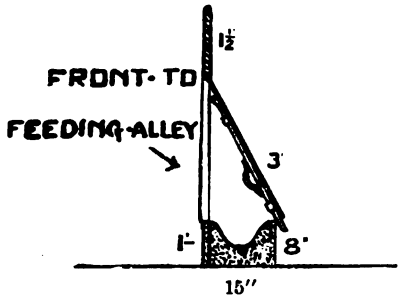

Fig. 35.—Cross Section of Trough and Swinging Front.

ceiling through the loft to the roof. These are 20 inches square and are provided with slides at the ceiling for regulation. These shafts are insulated with one thickness of lumber and paper on each side of the scantling frame, thus leaving an air space to specially insulate the shaft and guard against the cooling and retarding of air currents.

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THE TRADE IN HOG PRODUCTS.

The following table shows the exports of bacon, hams and pork from Canada from 1880 until the end of the past fiscal year:—

EXPORTS OF HOG MEATS FROM CANADA.

Fiscal Year.	Bacon.	Hams.	Pork.	Total.
	Lb.	Lb.	Lb.	Lb.
1880	8,616,739	955,603	1,281,391	10,853,733
1885	7,189,260	962,827	555,436	8,707,523
1890	7,235,336	256,746	233,899	7,725,981
1895	37,526,058	2,607,968	519,736	40,653,762
1900	132,175,688	2,856,186	1,109,550	136,141,424
1905	116,835,050	2,866,263	2,235,936	121,937,249
1908	92,001,910	3,173,950	769,932	95,945,792
1909	70,564,927	3,271,812	335,343	74,171,582
1910	45,576,883	3,242,806	599,081	49,418,770
1911	56,068,607	3,805,918	417,577	60,921,102
1912	59,979,963	3,124,595	434,480	63,539,038
1913	36,212,190	2,476,654	521,533	39,210,377
1914	23,859,754	1,890,182	1,811,204	27,561,140

The falling off in exports does not indicate a serious decline in the raising of hogs. According to the census of 1891 there were that year, on Canadian farms, 1,733,850 hogs, which number had, ten years later, increased to 2,353,828, and in 1911 to 3,610,428.

The decline in exports must, in large measure, be attributed to increasing consumption in Canada. During the years of heavy export the supplies shipped out were produced almost entirely in the province of Ontario. The western provinces, while filling with people, were slow to produce hogs until the past two or three years, when a great increase in production has taken place. Up to 1913 packing houses in Ontario and Quebec had a large market west of the Great Lakes, but the tide has turned. Prairie province farmers, owing to continued high prices for pork, have turned their attention more and more to the feeding of hogs on their low-grade and damaged grain, and since the fall of 1913 have been shipping hogs east in large numbers, 72,000 head having been forwarded up to the end of April, 1914.

The exports of hog products from Canada have, until quite recently, been almost entirely to Great Britain. With the coming into force of the "Wilson-Underwood" tariff in September, 1913, the markets of the United States of America were thrown open to meat products on a free basis. Since that time increasing quantities of Canadian bacon, hams and pork have been finding their way over this international boundary.

MEAT INSPECTION.

Federal meat inspection in Canada, which is confined to establishments doing an export or interprovincial trade, was inaugurated in September, 1907. From statistics supplied by the Meat Inspection Division of the Department of Agriculture, the slaughtering of hogs in Canada showed a considerable increase during the fiscal year ending March 31, 1914, over the previous one. The killings in eastern houses showed a decrease which was more than met by an increase in the west. The following table

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shows the numbers and percentages of swine slaughtered in inspected establishments in Eastern and Western Canada and for the whole Dominion:—

SWINE SLAUGHTERED AT INSPECTED ESTABLISHMENTS, YEARS ENDING MARCH 31, 1913 AND 1914.

Eastern Canada	1914	1,230,467	= 68.41 per cent of total kill.
Eastern Canada	1913	1,377,096	= 85.66 " " "
Decrease		146,629	= 10.64 per cent under 1913.
Western Canada	1914	568,189	= 31.59 per cent of total kill.
Western Canada	1913	230,645	= 14.34 " " "
Increase		337,544	=146.34 " over 1913.
All Canada	1914	1,798,656	
All Canada	1913	1,607,741	
Increase		190,915	=11.87 per cent over 1913

The following table shows the number of hogs slaughtered in inspected establishments in Canada since the inauguration of Federal inspection:—

SWINE SLAUGHTERED IN CANADA AT INSPECTED ESTABLISHMENTS.

Eight months ending March 31, 1908	861,989
Year ending March 31, 1909	1,532,796
Year ending March 31, 1910	1,261,496
Year ending March 31, 1911	1,452,237
Year ending March 31, 1912	1,852,997
Year ending March 31, 1913	1,607,741
Year ending March 31, 1914	1,798,656

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DISEASES.

HOG CHOLERA.

By F. TORRANCE, B.A., D.V.S., *Veterinary Director General.*

Hog cholera is a contagious disease of swine. It does not appear to affect other species of animals, and is characterized by extreme contagiousness and a high death rate. It is known in every part of the world and is prevalent in the United States to an alarming extent, causing enormous losses. In Canada, the disease appears from time to time in various parts of the country where the infection has been brought in some way or other.

The cause of the disease is a germ, and without the presence of the germ there can be no hog cholera. In other words, such things as neglect, bad feeding, filthy surroundings, have no power to produce hog cholera. But when the infection is introduced among hogs under such conditions, the disease spreads with great rapidity.

The spread of the disease occurs whenever the germs from a diseased hog gain access to the healthy one, and this takes place in many different ways. Actual contact of the healthy and diseased hogs is a sure way to spread the disease, but it can be conveyed in many other ways.

The diseased hog gives off the germs of the disease in his urine and droppings, and thus distributes infectious matter throughout his pen, pasture, or the railway car in which he is going to market. Healthy hogs placed in such premises after the diseased ones have been removed will contract the disease.

Another way infection is carried is upon the feet of men or animals, including birds. Curious neighbours, wishing to see what hog cholera looks like, may easily take the infection home to their own hogs on their boots or clothing. Wandering dogs may also act as carriers, and the common domestic pigeons may feed in an infected pen, and fly to some neighbouring farm carrying the infection on their feet.

Another mode of infection has recently come to light and is responsible for many outbreaks of the disease in Canada. This takes place through the feeding of uncooked garbage and swill containing scraps of pork, bacon rind, etc., in the raw state. The explanation of this lies in the fact that in the United States many hogs are sent to the slaughter house when in the early stages of hog cholera, and are killed, turned into pork and consumed for food without hindrance. This is possible because there is a lapse of some days between the time when the hog becomes infected and the time when he shows symptoms of it. This is known as the period of incubation, and hogs killed during this period may, and often do, show no symptoms to the meat inspector that anything is wrong.

The meat from such hogs contains the germs of the disease, and such processes as salting, spicing, or smoking, do not destroy these germs. Cooking does destroy them, and as a quantity of United States pork is consumed in this country, owners are cautioned not to feed kitchen refuse to hogs unless it has first been cooked.

Infection may also be carried from farm to farm in the water of a stream flowing through an infected pasture or pig-pen.

Symptoms.

The early symptoms are not characteristic of the disease and may not enable a definite opinion to be formed. The hog loses his appetite, partly or altogether, is sluggish, disinclined to move, and if compelled to do so may cough. These symptoms occurring among hogs in the vicinity of an outbreak of hog cholera, should be viewed with suspicion and the nearest veterinary inspector should be notified at once.

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The sick hogs soon become thin and weak, walking with a staggering gait, especially with the hind legs, but hogs may die in a few days, before they have had time to lose much flesh.

The skin frequently becomes red in patches, the colour turning deeper and more purplish as the disease advances. These patches usually occur inside the legs, under the body, or behind the ears, but may be seen anywhere.

The eyes discharge mucous secretion and the lids may be gummed together by it.

The bowels are generally loose, and a profuse diarrhœa may occur, although in some cases there may be constipation.

The sick hog generally goes off by himself, and is found lying in a quiet corner of his pen. If compelled to get up, he does it unwillingly, stands with his back arched and his belly drawn up, or moves in a weak, staggering manner, and may fall over.

A sick hog seldom shows all the symptoms described above, and in many cases it requires an expert to decide what is the matter. Usually one or two of the symptoms are well marked, such as coughing and rapid breathing, or diarrhœa and tucked-up appearance, or redness of the skin and discharge from the eyes.

The symptoms have been described at some length, so that the farmer may be on his guard if any of them are noticed, and call in the inspector before the infection has time to spread.

There is a great difference in the severity of the disease in various outbreaks. Sometimes it is of a severe or virulent type and rapidly fatal. In other outbreaks the type is mild and recovery frequent. The latter type may be considered just as dangerous to the community as the former, as it is more difficult to detect, and the recovered hogs are apt to spread the disease far and wide before it is recognized.

The duration of the disease is uncertain. A hog may die in a very few days, or may live for some weeks. Death does not always follow an attack of the disease, and a small number of hogs would survive an outbreak of the disease if it were thought wise to permit them to do so. Such hogs, however, are carriers of the disease. The germs exist in their blood, although producing no active effect. The hog is immune, but can give the disease to other hogs that are not immune. For this reason it is bad policy to attempt to cure the disease. The more recoveries you get, the more chances of getting fresh outbreaks of the disease as soon as new hogs are brought into the neighbourhood. It is far better to stamp out the disease by killing all the diseased hogs and disinfecting the premises.

Examining a Hog After Death from Hog Cholera.

It is often necessary to examine a dead hog to make sure of the nature of the disease, and the following appearances may be looked for: Reddening of the skin; bloody red spots on the surface of any of the internal organs such as lungs, heart, bowels and stomach; a peculiar speckled appearance of the kidneys when the outer covering is stripped off, something like a turkey's egg; ulceration of the inner lining of the large bowel, especially near its junction with the small intestine; redness of the lymph glands; enlargement of the spleen; inflammation of the lungs (pneumonia). The examination should be made by an expert if possible.

When Hog Cholera is suspected a veterinary inspector should be notified without delay. The owner or person in charge is bound by law to do this, and if he fails to do so may lose his compensation for any animals slaughtered under the Act, besides being liable to a heavy fine for his neglect.

How the Disease is Dealt with in Canada.

The veterinary inspector, upon making sure of the existence of hog cholera, will have all the hogs on the premises slaughtered immediately and their carcasses satisfactorily destroyed. The inspector assesses the value of the hogs slaughtered, and if

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the owner has not been guilty of any neglect or infraction of the law, and carries out the instructions of the inspector regarding the disinfection of the place, he will receive compensation for his losses up to two-thirds of the assessed value.

The premises occupied by the diseased hogs are placed in quarantine until thoroughly cleaned and disinfected to the satisfaction of the inspector, and no fresh hogs are allowed on the premises for a period of at least three months afterward. The inspector then revisits the premises to make sure that the regulations have been complied with, and, if satisfied that such is the case, will recommend to the Minister of Agriculture the release of the premises from quarantine. The Minister is the only person authorized to grant this release, and he grants it on the recommendation of the inspector.

Cleaning and Disinfecting Premises.

The following are the *official rules* for the cleansing and disinfecting of premises after outbreaks of hog cholera:—

After infected hogs have been slaughtered the carcasses should either be completely burned or buried at a depth of at least 8 feet; if buried, they should be covered to a depth of several inches with quick lime.

In most cases it will be found safest and most profitable to remove and burn the floors, partitions and lining of pens previously occupied by infected hogs, as also any rails, loose boards or other lumber to which such hogs have had access.

Pens, other buildings and fences with which affected hogs have been in contact are, when possible, to be thoroughly gone over with hot steam or boiling water before being coated with fresh lime wash, each gallon of which should contain a pound of carbolic acid, creolin or other germicide of equal strength.

The surface soil of pens and yards should be removed to a depth of at least 6 inches and well mixed with fresh lime, which should also be freely applied to the surface of the newly-exposed soil. Ground so treated should receive over the lime a fresh coating of earth or gravel. Fields, orchards and gardens to which the diseased hogs have had access are to be ploughed as soon as possible.

Every precaution should be taken to prevent the conveyance of infection from one place to another by means of the clothes or shoes of persons who have been attending to or otherwise dealing with diseased hogs.

Visitors should be discouraged during outbreaks of disease or until cleansing and disinfecting operations, as above indicated, have been completed.

Animals, especially dogs, are frequently the means of conveying the disease, and should, wherever possible, be prevented from entering infected premises.

When, owing to severe weather or unavoidable cause, it is found impossible to cleanse and disinfect immediately pens or yards formerly occupied by diseased hogs, such pens or yards should be closed up in such a manner as to prevent persons or animals obtaining access thereto until such cleansing and disinfection can be properly carried out.

Owners of diseased hogs should bear in mind that inspectors cannot recommend the release from quarantine of any premises the disinfection of which has not been carried out in a satisfactory manner.

Section 88½ of the Quarantine Regulations provides that the use of hog cholera serum, or virus, being considered a source of danger, the importation, manufacture, sale or use of such serum or virus is prohibited.

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REGULATIONS RELATING TO HOG CHOLERA AND SWINE PLAGUE.

By Order in Council dated June 8, 1911, in virtue of "The Animal Contagious Diseases Act, R.S.C., 1906."

1. No hog which is or has been affected with, or which has been exposed to hog cholera or swine plague, shall be permitted to run at large, or to come in contact with any hog which is not so affected.

2. Any inspector may declare to be an infected place, within the meaning of the Animal Contagious Diseases Act, any place or premises where the infection of hog cholera or swine plague is known or suspected to exist.

3. No hog or other animal, nor any portion or product thereof, shall be removed out of a place so declared to be an infected place, without a license signed by an inspector.

4. Inspectors are hereby authorized to inspect any hogs affected with hog cholera or swine plague, or suspected of being so affected, or which have been in contact with animals so affected or suspected of being so affected, or which have been in any way whatsoever exposed to the contagion of hog cholera or swine plague, and for the purpose of making such inspection may order any such animals to be collected, detained or isolated.

5. The expenses of, and incidental to, the collection, isolation, seizure, or otherwise dealing with animals for the purpose of these regulations shall be borne by the owners of the animals, and no indemnity shall be allowed to the owner in case of damage arising out of or resulting from such actions, except as hereinafter provided.

6. Hogs affected with hog cholera or swine plague, or which have been in contact with or in close proximity to hogs affected with hog cholera or swine plague, shall on an order signed by an inspector duly appointed under the Animal Contagious Act, be forthwith slaughtered and the carcasses disposed of as in such order prescribed, compensation to be paid to the owners of such animals if and when the Act so provides.

7. After any place or premises has been declared to be an infected place on account of the existence or suspected existence thereon of hog cholera or swine plague, no hogs shall be brought on to such place or premises, except with the authority of an inspector, until the said place or premises shall have been declared to have been free from infectious or contagious disease, as provided in section 20 of the Animal Contagious Diseases Act, and in case of the infraction of this regulation any compensation to which the owner might otherwise be entitled shall be withheld.

8. Compensation may be withheld in the case of hogs fed on uncooked garbage or kitchen refuse, or on any raw animal flesh or similar food likely to convey the infection of hog cholera or swine plague.

9. Before an order is made for the payment of compensation in any of the cases aforesaid, there must be produced to the Minister of Agriculture a satisfactory report, order for slaughter, certificate of valuation and slaughter, and certificate of cleansing and disinfection, all signed by an inspector.

10. Every yard, stable, hog pen, or other place or premises, and every wagon, cart, carriage, car or other vehicle, and every utensil or other thing infected or suspected of being infected with hog cholera or swine plague shall be thoroughly cleansed and disinfected by and at the expense of the owner or occupier in a manner satisfactory to an inspector.

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TUBERCULOSIS

BY

ROBERT BARNES, V.S., *Chief Meat Inspector.*

It is not intended to dwell at any length upon a scientific description of tuberculosis, as a very complete and coincise statement of facts concerning its insidious yet serious nature has already been published in pamphlet form, especially prepared for farmers and others interested in live stock. Copies of this may be obtained from the Publications Branch, Department of Agriculture, Ottawa.

While hog cholera and many other contagious diseases are of rare occurrence among Canadian swine, the same cannot be said of tuberculosis.

Its existence, and localities in which it may be found, can best be determined by the information obtained from packing houses operating under the provisions of the Meat and Canned Foods Act. In such plants each animal is carefully inspected and the different diseased and abnormal conditions found are reported daily to the Veterinary Director General. Statistics compiled from these reports show that for the fiscal year ending March 31, 1914, 14 per cent of the hogs for all Canada were affected with tuberculosis, an increase of 4 per cent as compared with the year ending March 31, 1910.

These figures show an unfortunate condition in connection with the swine industry. While the actual monetary loss in inspected establishments due to condemnations for this disease alone during the past year totalled $75,000, it must not be forgotten that the slaughter in these plants represented only 50 per cent of the total kill for the Dominion. In view of this fact, the percentage of tuberculosis above stated is, in all probability, lower than that which actually exists, as the managers of inspected establishments buy only such swine as are apparently healthy.

This disease is not confined to a few localities, nor to any one province, but is distributed over the entire Dominion, and is generally found in proportion to the extent to which the dairy industry has been developed. The only marked exception to this is noted in the corn district of Ontario where the disease is prevalent and where dairying cannot be said to be carried on to any great extent.

Cause.

It is of course undisputed that the disease is due to the introduction into the system of the bacillus of tuberculosis which, in the case of swine, may safely be said to occur by the digestive rather than by the respiratory tract. The bacillus found in hogs is almost invariably of the bovine type. It is therefore important, if the disease in hogs is to be prevented, that the disease in cattle be controlled and, if possible, eradicated.

In order to show the importance of bovine and porcine tuberculosis, and their relation to one another, I would quote the following extract from Circular No. 201, Bureau of Animal Industry, written by J. R. Mohler, A.M., V.M.D., and H. J. Washburn, D.V.S.:—

> "The experiments of the Bureau of Animal Industry show that when hogs were fed on tuberculosis milk for only three days the post mortem examination held 107 days later indicated that 83·3 per cent of the animals had become tuberculous. When hogs received tuberculous milk for thirty days and were allowed to live fifty days longer, 100 per cent of the animals had developed generalized tuberculosis."

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The methods by which hogs become affected may be briefly summed up as follows:

(1) The milk from tuberculous cows;
(2) Infected faeces of cattle;
(3) Feeding uncooked garbage.

The feeding of milk and its by-products from tuberculous cows is the chief factor in the spread of the disease in swine.

In the province of Ontario, where the dairying industry has been fostered and developed, the percentage of tuberculosis has been found to be 16 per cent, as against 5 per cent for Manitoba and 4 per cent for Alberta, in which provinces dairying is as yet in its infancy. In Ontario it is found that in those sections where the milk is separated on the farms and the raw milk fed to hogs, the percentage affected is highest. The number of affected hogs received from shipping points in close proximity to cheese factories where the whey is pasteurized is noticeably less than those from stations in the same districts where the by-products are not treated.

In Denmark, where it is compulsory to pasteurize all whey and skim milk before they may be fed to hogs, the percentage of tuberculosis in hogs has been materially reduced.

While the practice of allowing hogs to follow cattle in the feed lots does not exist to a great extent in Canada, it is no doubt the means by which the disease is often disseminated. Cows affected with tuberculosis, yet showing no external symptoms, may be found passing faeces loaded with tubercle bacilli. Hogs that are permitted to come in contact with the faeces from cattle invariably work in it, eating such undigested grains as may be found, and infect themselves if the bacilli be present.

Uncooked garbage and offal is fed to hogs throughout the entire country, many small slaughterers depending wholly on this means of getting rid of what would otherwise become a nuisance, especially during the hot weather. Garbage wagons may be seen daily in many of our cities, towns and villages, gathering garbage and such other filthy and unheard of materials as are thrown out by householders, hotels, restaurants, etc. This refuse is altogether too often taken to the outskirts and fed raw to hogs, the meat of which is later exposed for sale as human food. It should not require any learned or scientific arguments to convince even the most uneducated that tuberculosis and other diseases of swine are spread by this unsanitary practice.

While the disease may also be spread by infected brood sows, attendants, poultry, etc., the danger from these sources (while it must not be minimized) is slight when compared with the contributing causes previously mentioned.

Symptoms.

It is not necessary to dwell on the symptoms or other means of identification, as it is extremely rare that even the qualified veterinarian is able to make a reasonably sure diagnosis by a physical examination. It is a fact that hogs which upon slaughter are found to be affected are frequently the best finished and show the most thrifty appearance of the day's kill. As the life of the average hog is from six to eight months, it can be readily understood why symptoms of the disease are not more often seen and better understood.

As tuberculosis is the one disease where prevention is possible and cure improbable, a few suggestions as to its prevention and eradication are offered:—

1. Separation of healthy from infected animals. In the case of cattle this can be determined by the tuberculin test.

2. With hogs fed and reared on farms where there are tuberculous cattle, I would recommend that they be fed until fit for market, then slaughtered at an establishment having Government inspection so that they may be carefully examined as to their fitness for human food.

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3. When all this has been accomplished, careful and systematic attention should be paid to disinfection and other sanitary requirements, after which a new start with healthy stock may be made. If due attention is paid to the health of the cattle on the farm, to sanitation and the choice of proper food, the danger of the hogs becoming infected with tuberculosis will be reduced to a minimum.

As to the proper food, B.A.I. Bulletin No. 144 (United States Department of Agriculture), in dealing with this subject, strongly advises:—

1. That all raw products returned from the creamery be scalded;

2. If cattle are not tuberculin-tested, and a hand separator is used, that the skimmed milk be scalded;

3. That hogs be allowed to feed only behind such cattle as have successfully stood the tuberculin test;

4. That meat, offal and garbage be fed only after they have been thoroughly cooked.

The prevention of tuberculosis in hogs does not entail an excessive amount of labour or expense, and the benefits to be derived not only repay the producer but ensure a safer meat food for the consumer.

When we consider the enormous financial loss caused by this disease (as 94 per cent of the condemnations in packing houses are due to tuberculosis), and the comparatively easy manner in which it may be prevented, it is to be hoped that producers will bestir themselves in an effort to materially reduce its prevalence.

The day may not be far distant when slaughterers will buy only subject to post-mortem inspection. In this case the modern, wideawake hog raiser will not be compelled to bear a share of the loss occasioned by the careless indifferent feeder who forwards to market (perhaps in the same car) a number of diseased hogs, as is too often the case at present.

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